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MAY 2006

# NATIONAL GEOGRAPHIC



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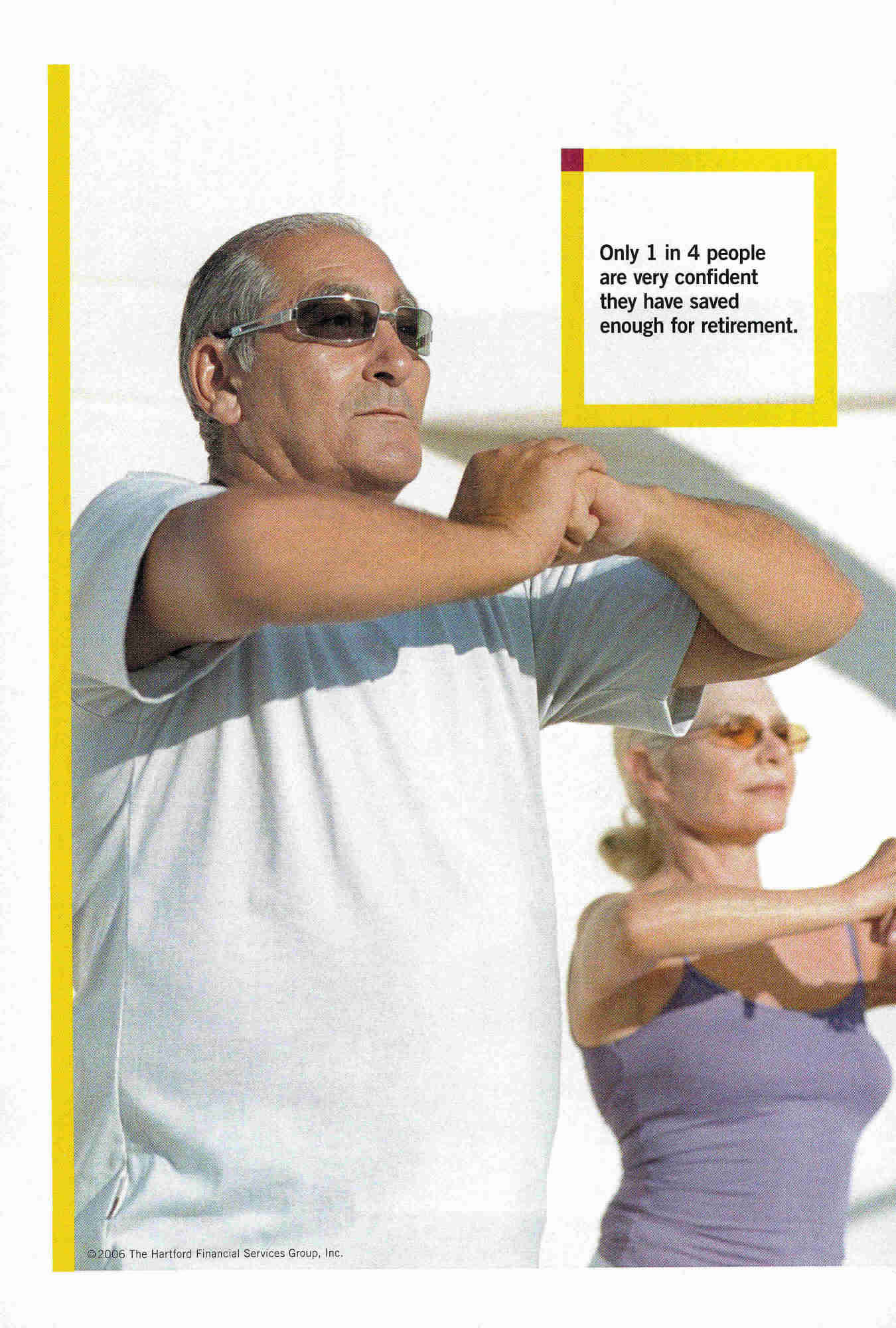
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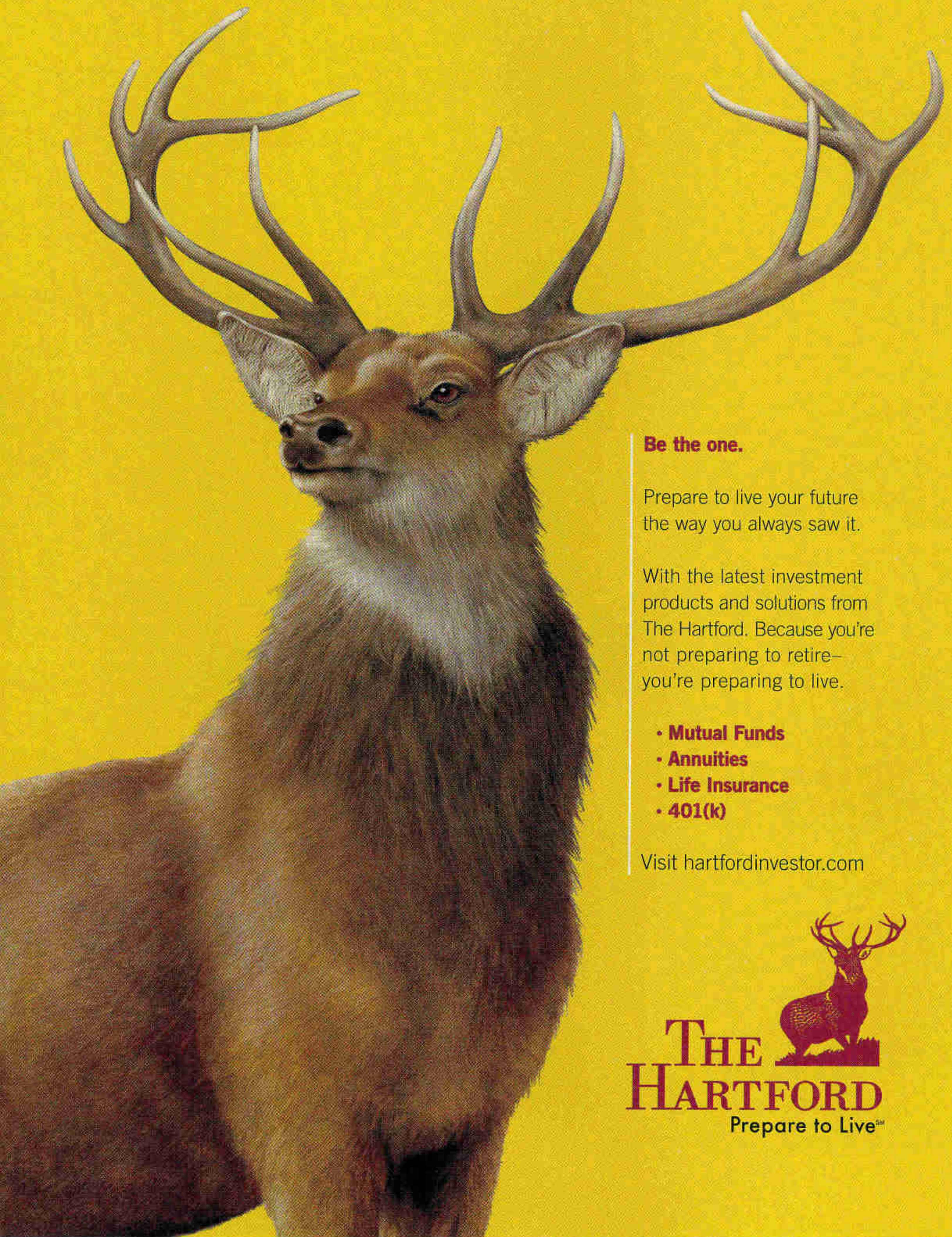
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**Fishing Cat** (*Prionailurus viverrinus*)

**Size:** Head and body length, 66 - 86 cm; tail, 21 - 23 cm **Weight:** 6 - 12 kg **Habitat:** Swamps, marshes, oxbow lakes, reed beds, tidal creeks, mangrove areas and, less frequently, fast-moving watercourses **Surviving number:** Estimated at fewer than 10,000 mature breeding individuals



*Photographed by Erwin and Peggy Bauer*

# WILDLIFE AS CANON SEES IT

Who says cats and water don't mix? True to its name, the fishing cat is a dedicated angler and spends most of its life around water. It thinks nothing of diving right in, in fact, when a juicy fish remains stubbornly out of paw's reach. But not all its entrées are underwater; the fishing cat will take anything from frogs and snakes to rodents and even wild pigs. Active during both night and day, it roams a home range of up to 22 square kilometers troubled by no predators other

than humans. Its habitat, however, is dwindling as wetlands and marshes fall prey to settlement, draining for agriculture, clearing for timber, pollution, over-hunting and over-fishing.

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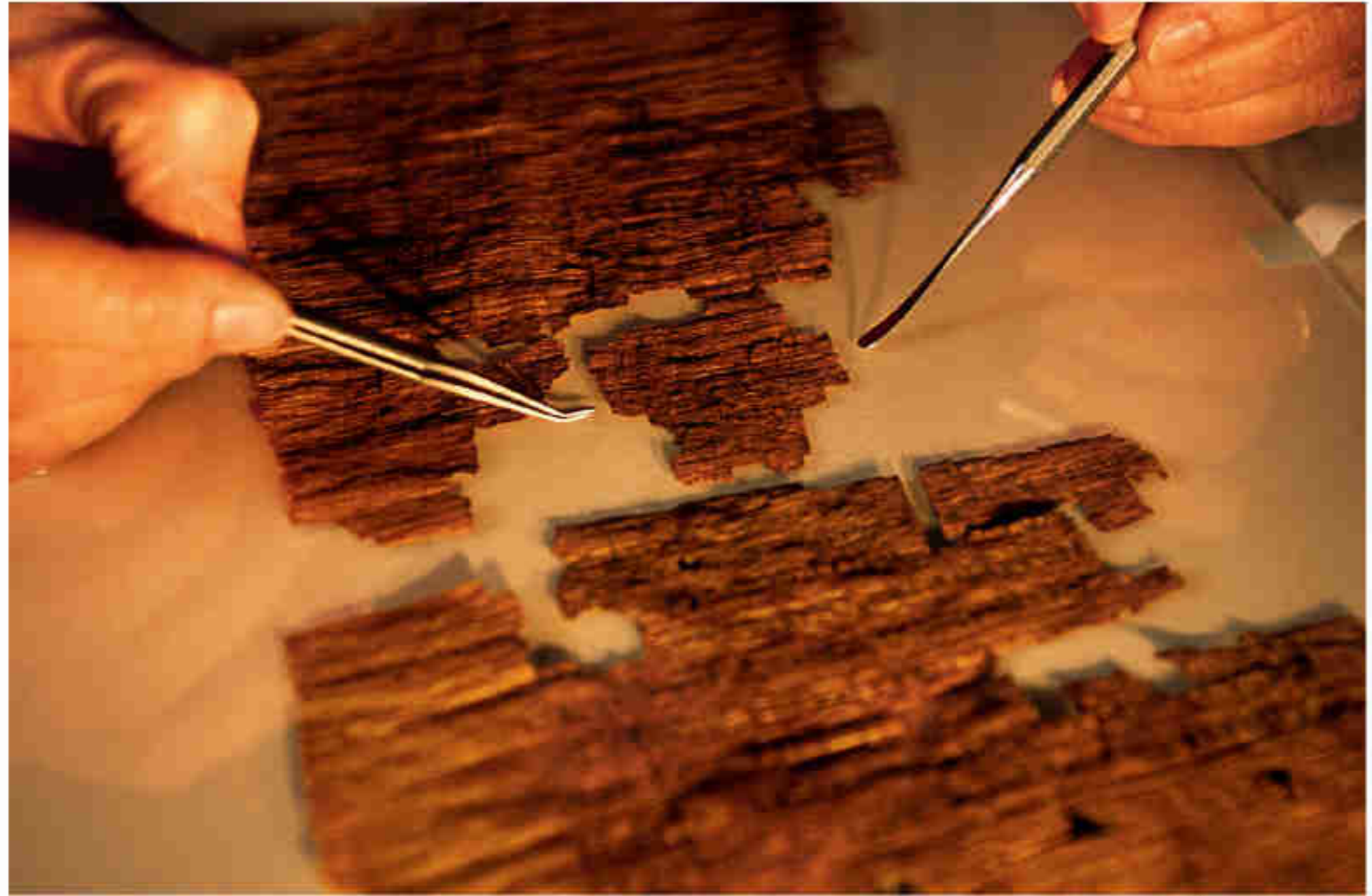


# NATIONAL GEOGRAPHIC

MAY 2006 • VOL. 209 • NO. 5

## The Judas Gospel

In a laboratory outside Geneva, Switzerland, a conservator carefully pieces together fragments of the long-lost papyrus manuscript.



KENNETH GARRETT

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- Fall of the Wild** 42 The interests of big oil, wild creatures, and native populations collide on the largest remaining piece of U.S. wilderness, Alaska's North Slope.  
**BY JOEL K. BOURNE, JR. PHOTOGRAPHS BY JOEL SARTORE**
- The Judas Gospel** 78 Lost for nearly 1,700 years, a crumbling manuscript presents the most hated man in history in a new light.  
**BY ANDREW COCKBURN PHOTOGRAPHS BY KENNETH GARRETT**
- Duchy of Cornwall** 96 Prince Charles's great experiment is proving a success on ancestral lands turned testing grounds for his ideas about sustainable agriculture, architecture, and community.  
**BY SANDY MITCHELL PHOTOGRAPHS BY CATHERINE KARNOW**
- Allergy Misery** 116 Millions suffer from them, and thousands die each year. The rising incidence of allergies is nothing to sneeze at.  
**BY JUDITH NEWMAN PHOTOGRAPHS BY DAVID McLAIN**
- River of Spirits** 136 The Irrawaddy River in Myanmar is a source of continuity and hope in a country at odds with itself.  
**BY KIRA SALAK PHOTOGRAPHS BY STEVE WINTER**

**COVER** A polar bear feeds on a whale carcass at the edge of the Beaufort Sea on Alaska's North Slope. **PHOTO BY JOEL SARTORE**

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Sandhogs Beneath New York



Students



Darwin's Tortoise

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Oil fields already dot the landscape of this magnificent wilderness. Meet the wildlife that call the region home, experience its beauty, and learn about its challenges in Sights & Sounds, narrated by photographer Joel Sartore at [ngm.com/0605](http://ngm.com/0605).

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**Imagine a catastrophe.** Rescue workers are saving lives and property; reporters are flocking to the scene to interview eyewitnesses. But wait—instead of consensus, there's confusion and conflict. Everyone has witnessed the same event, but everyone interprets it differently. Reporters, trying to sort matters out, are perplexed. Can they ever get the story right?

Covering Alaska's North Slope and the debate over oil drilling is like that. You wonder if the "witnesses" are talking about the same landscape. Listen:

Alaska Senator Ted Stevens says, "We constantly hear that this is a pristine place, the most beautiful place on Earth.... It is a barren



A caribou herd meanders across the North Slope's Cape Sabine.

wasteland, a frozen wasteland.... Constant, constant tundra, no trees, no beauty at all."

Former President Jimmy Carter says, "I have been to the coastal plain of the Arctic National Wildlife Refuge. Far from being the frozen 'desert' some suggest, this is a rich, Serengeti-like haven of life: nursery for caribou, polar bears, walruses, and millions of shorebirds and waterfowl."

To sort matters out for ourselves, we sent writer Joel Bourne and photographer Joel Sartore to the North Slope for an in-depth look. They spent months in remote locations. They listened to a broad range of voices. The result of their diligence is a compelling story that illuminates a landscape at risk.

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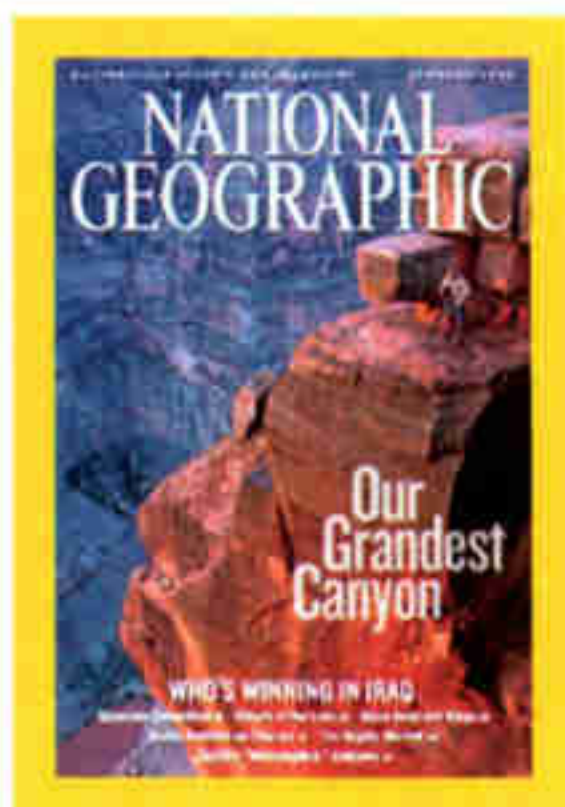
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## LETTERS



**January 2006** *"Genocide Unearthed"* prompted many to write about groups they felt should have been included in the article. Readers also reacted to the cover photo of the Grand Canyon—in an unexpected way. Letter writer Ken Kemp asked, "Has anyone noticed that the red cliff profile on the cover looks like the profile of a classic American Indian face?"

↪ Voice opinions about May stories at [ngm.com](http://ngm.com).

### Who's Winning in Iraq

Frank Viviano's article rightly emphasizes that construction is the most important industry in Iraqi Kurdistan. In fact the building boom started in the late 1990s thanks to the oil-for-food program. Through UN-Habitat, a vibrant construction industry emerged. The number of local contractors increased from 15 to 900 while 22,000 houses, 730 schools, and 132 health centers

were built. More than 80,000 jobs were created. The "controversial" oil-for-food program should get credit for its impact in Kurdistan and its crucial support to the Builders.

**DANIEL BIAU**

Deputy Executive Director, UN-Habitat  
Nairobi, Kenya

Thank you for showing a true picture of the effects of a land mine. These indiscriminate

weapons continue to maim and kill long after the end of the hostilities that supposedly justified their use. No amount of discussion can convey the atrocity of using land mines on people. Hopefully minds have been changed after seeing this photo.

**RON BOYCE**

Saint John, New Brunswick

I'm angry with your decision to show the picture of the woman injured by the mine lying there with one foot blown off and a huge piece of flesh missing from the other leg. I realize you're trying to make a political point about land mines, but is this something that is appropriate for the children that are a large part of your audience?

**LARRY CZAPLYSKI**

Herndon, Virginia

# essential<sub>2</sub>sa





I found the story of the Builders in Iraq refreshingly optimistic, especially the outlook of the Nadirs' daughter Mivan. It was wonderful to read about a person my age with such a hopeful view of the future.

**MARSHALL MOORE**  
Huntsville, Alabama

### **Genocide Unearthed**

I was shocked that your article did not mention the genocidal expulsion of the eastern European Germans beginning in the final days of World War II. According to some experts, 2.5 million persons, mostly women, children, and elderly, died in the expulsion. Many more died as a result of living conditions in the bombed-out Germany into which they were expelled. The expulsion of the Germans was

an act of genocide unparalleled in peacetime history.

**KEARN C. SCHEMM, JR.**  
President, German World Alliance  
Arlington, Virginia

*Taking stock of genocide—its scope, number of victims, indeed every aspect of its damage—is a difficult undertaking. So it came as no surprise that readers wrote to speak out for groups not represented or to question other parts of our coverage. "Genocide Unearthed" was not a definitive study: It covered only the past century, and even within that epoch, it was not comprehensive. While such eminent scholars as Yehuda Bauer say the expulsion of ethnic Germans was not a genocide, historians note that many aspects of World War II will be reassessed as new documents become available.*

*Barbara Harff at Clark University's Strassler Family Center for Holocaust and Genocide Studies notes, "As genocide scholars, we are often challenged by representatives of different victimized groups. This is understandable. But not every crime is a genocide. In order to explain different phenomena, we need to be precise in our definitions and cautious in our estimates. At the same time, we are always open to new evidence."*

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As a proud veteran of Operation Iraqi Freedom, I want to thank you for using "genocide" to describe Saddam Hussein's crimes in Iraq. It's time for the world to support coalition efforts in Iraq as a humanitarian intervention. It doesn't matter to Saddam Hussein's victims or their families that the United States never found weapons of mass destruction. All they care about is that Saddam's reign of terror is over.

**ANDREW J. DEKEVER**  
West Point, New York

The only way that genocide can be stopped is if we stop looking at each other as Americans, Jews, communists, and so on. We need to embrace all people and dissolve the boundaries that segregate us. We should celebrate our achievements as a species, not as a nation or race, and learn about each other's beliefs.

**TRAVIS OLSON**  
St. Paul, Minnesota

From our online forum  
ngm.com/0601

## Last Days of the Ice Hunters?

As a vegan nonviolent Buddhist, I struggled to read your article. But after reading I want to thank you for showing us how pollution-induced global warming affects individuals, their families, and traditional cultures, whatever their practices and diets may be.

**SUZANNE HOPKINS SUBRAMANIAN**  
Charlotte, North Carolina

## The Grandest Canyon

Michael Nichols's photography is as awe-inspiring as Virginia Morell's essay is thoughtful. The two do not, however,

complement each other. I was struck by the Anasazi attachment to their historical home that was evinced by Morell. Nichols's images allowed me to see the natural character of the canyon in a way I never have before. But the people with whom Morell so eloquently colors the canyon are painfully absent from the images.

**PATRICK WALTERS**  
Newark, Delaware

The cover photo is impressive. How was this perspective of the canyon achieved?

**W. B. PRICE**  
Englewood, Florida

*Photographer Michael Nichols responds: "John Burcham, my assistant for the Grand Canyon story, is a rock climber and part mountain goat. He led me out to that ledge via a crawlway—no ropes. John then made his documentary image of me by scrambling along the canyon rim. It was pretty exciting and unprecedented for my assistant to get his photograph on the cover. It thrilled my mother more than all the covers I have shot over the years. My advice for photographing the canyon is simple. Patience, wait for the light. Be there when it's changing. Treat the canyon like a temple. Bring lots of sunscreen and water."*

## ZipUSA: Monroeville, Alabama

The photograph of the audience at the *Mockingbird* stage play shows about 75 people, of whom only two appear to be black. Does this reflect a vestige of discrimination still alive 45 years after Harper Lee published the book?

**VINCENT M. JOLIVET**  
Bothell, Washington



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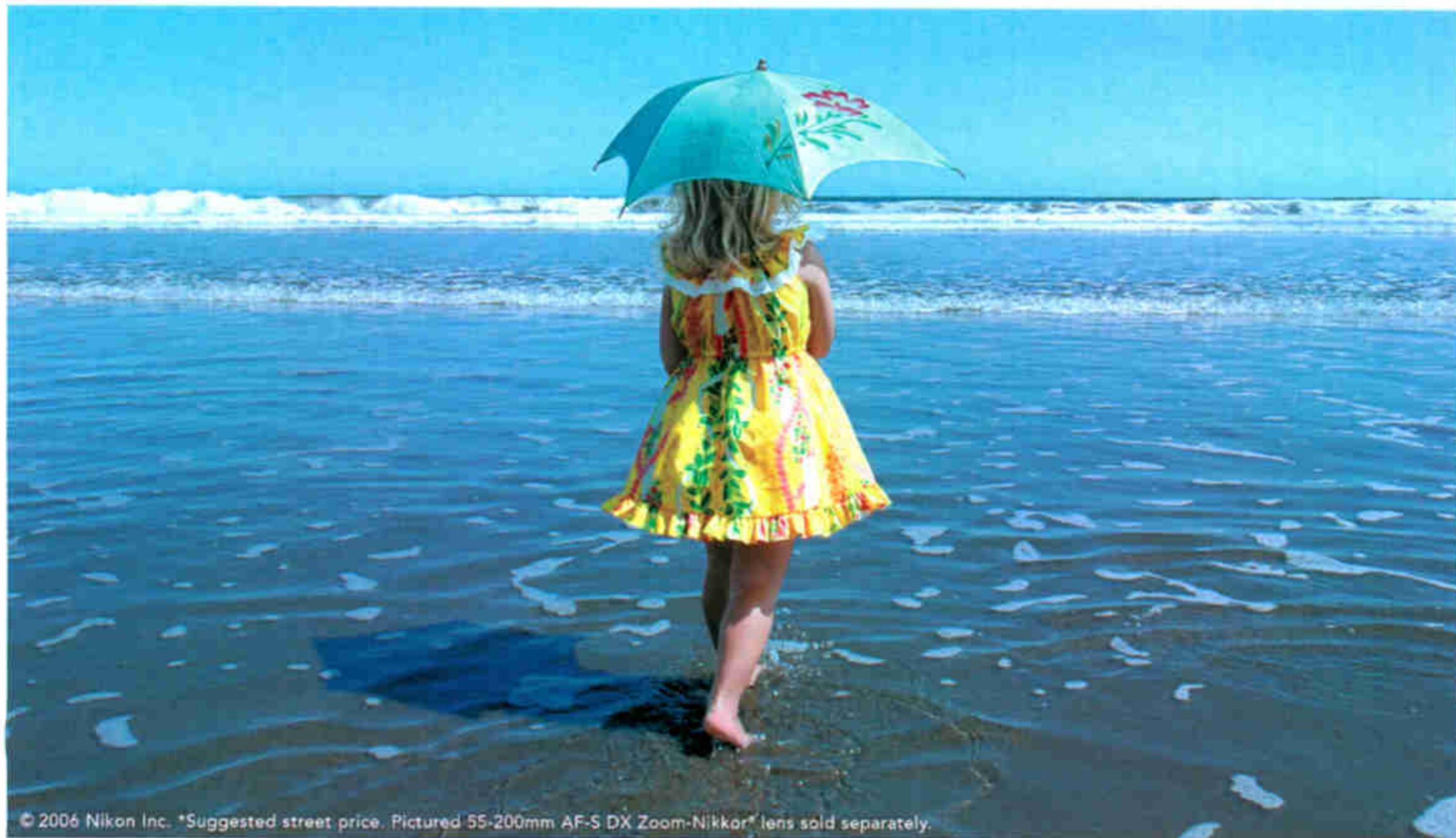
**Be a National Geographic Photographer** Take your best shot—and send it to NATIONAL GEOGRAPHIC. Editors will select from the first 5,000 photographs submitted electronically each month. The theme for the August 2006 Your Shot is “Where I Vacation.” For guidelines, a submission form, and more information, go to [ngm.com/yourshot](http://ngm.com/yourshot).



**Close Study** Jason Eskenazi arrived in Jerusalem in 2004 with 25 point-and-shoot cameras, 250 rolls of film, and an ambitious idea: teach photography to children from the local Muslim and Jewish communities. Though the groups were taught separately, his aim was to get them to see the city they share from each other's point of view. This image from his “Kids With Cameras” workshop shows a girl reading the Koran near her house in the city's Muslim quarter. It was made by her sister Raneen, who is now 13. Eskenazi never asked for his students' surnames. “It was a way to protect them,” he says. “This can be a dangerous place.”



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Barefoot and baked by the sun, a worker toils in the salt marshes near Baku, Azerbaijan.

Reza, a trained architect, turned to photography as a dissident during the Iranian revolution. He now lives in Paris.

**Farhad's Tale** I met a man in Baku, Azerbaijan, named Farhad. He heard my camera's trigger mechanism as he worked, and he raised his head to smile bitterly. He said, "I wish I had a picture of myself earlier on so that you could compare." He and his family were refugees from the fighting between ethnic Armenians and Azeris that flared in 1992, soon after the fall of the Soviet Union. He told me this story:

"I was a teacher for 18 years, then a high school principal, near Karabakh. I lived with my wife, my five children, and my parents. One day the roar of war moved closer. We learned that towns were falling one after the other into Armenian hands, houses were being burned and people slaughtered. We hoped we would be spared. One day the Armenian military men arrived at our door.

"Now I live with my family in a slum on the outskirts of Baku. I work all day to extract salt so that I can feed my children. But that is nothing. The hardest part is that my kids do not go to school any longer, and that I—the man who was once a high school principal—cannot teach them anything myself. I leave before they wake. When I arrive back home at night after walking the long distance that separates me from the salt marshes, the children are already asleep."

**Photo Gallery** View more of Reza's images at [ngm.com/0310/feature1](http://ngm.com/0310/feature1).





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VISIONS OF EARTH





**Mindanao, Philippines** A dockworker in Zamboanga City hoists an Indian threadfish, part of the day's catch. Found in the Indian and Pacific Oceans, the fish is a member of the jack family and can grow to 55 pounds.

PHOTO: ROBERT HAIDINGER, ANZENBERGER AGENCY





**Jessore, Bangladesh** Behind a window at a Koranic school, children show off their henna-stained hands. Girls and women decorate their hands for religious holidays, weddings, and other celebrations.









**Rift Valley, Tanzania** A camera's long nighttime exposure reveals the red glow of lava spilling from Mount Ol Doinyo Lengai. The volcano's lava, which appears brown to the naked eye, has the consistency of olive oil.





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PHOTO: OLIVIER GRUNEWALD





This Galápagos tortoise is the oldest known living animal in the world.



**Darwin's Tortoise?** Harriet has led a mysterious life. The giant Galápagos tortoise at the Australia Zoo in Queensland was long mistaken for a male and used to be called Harry. Now her past is in question. Herpetologist Scott Thomson traced Harriet's former owners back to Charles Darwin, whose papers indicate he took three tortoises from the Galápagos in 1836. While some scientists disagree—Harriet's species lived on an island Darwin never visited—Thomson thinks that islanders could have transported the tortoise to the area where the famed biologist studied. One thing is certain: At more than 170 years old, Harriet is the oldest known living animal in the world. "I've seen photos of Harriet from the 1940s," says Thomson. "She has not changed a bit." —*Whitney Dangerfield*

## What's New?

**Bats' sense of touch helps them navigate.** When bats fly, air flows past tiny hairs growing out of touch-receptor bumps along their wings. If a bat's wing isn't curved a certain way during flight, the air becomes turbulent. The hairs detect that turbulence and convey the information to the bat's brain. The bat can then correct its course and avoid collisions, even in total darkness. Ohio University neuroscience professor John Zook recently tested this

by using hair-removal cream on bats' wings. The depilated bats could fly straight, but when they attempted to make sharp turns, they would suddenly drop or jump in altitude. When the hairs grew back, the bats were again able to turn normally.

**Whales may sing in different dialects.** Underwater microphones developed to detect earthquake rumblings have been picking up whale conversations. Biologists

studying the recordings have detected distinct tones and patterns that vary with the whales' home waters: Blue whales in the northwest Pacific sound different from blue whales of Antarctica. Scientists think that the dialects might help coordinate movement of whale groups and prevent inbreeding. Further research may reveal whether the dialects are part of a common language and whether they arise from genetics or are learned.





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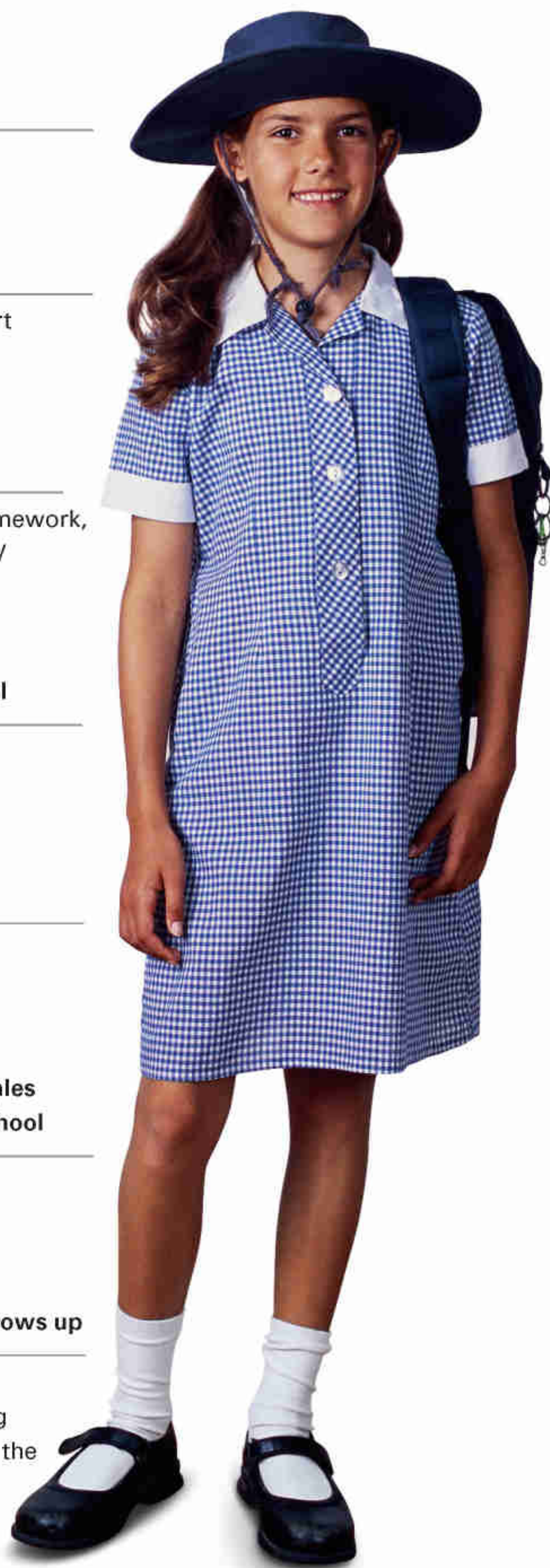
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## Students



**FEKRIA ABDUL SABOOR**  
Kabul, Afghanistan



**CLAIRE BORTHWICK**  
Melbourne, Australia

### Age

12 | 11

### Favorite subjects

Reading and sports | Math and art

### After-school activities

Helping mother with house chores | Netball, homework, watching TV

### Number of kids in her school

218 (all girls) | 600 (coed)

### Year her school was built

2002 | 1875

### Number of generations of females in family who have attended school

She's the first | Four

### What she wants to be when she grows up

Doctor | Athlete, representing Australia in the Olympics



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Identifying species. Diving deeper.  
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Foreman Mike Warfield (center) drives bolts into the tunnel walls.

**Beneath New York** The work is cold, dirty, deadly. Falling or getting crushed by machinery are just two in a swarm of hazards. And it all happens hundreds of feet below ground, in slick, black tunnels big enough to swallow buses. This is the realm of the sandhogs, a unique corps of workmen who carve out the utility shafts that keep New York City alive.

Sandhogs earned their name in the 1880s while clearing sand to build the Brooklyn Bridge. Today they're known for working on City Tunnel No. 3 (above), a 60-mile water line scheduled for completion in 2020 that will deliver 1.2 billion gallons a day from reservoirs upstate. The men work in close-knit bands, their jobs often passing from father to son. For Ralph Huggler (left), a 29-year veteran, it's a calling. Two sons have followed him into the tunnels. "I've tried to work on top, out in the real world," Huggler says. "But it doesn't fit. It's kind of a rat race." —Neil Shea



Work began on City Tunnel No. 3 in 1970. The project's price tag will be about six billion dollars.





## 2006 EMERGING EXPLORER

### Start something empowering

*Born in a Tibetan refugee settlement, Losang Rabgey turns her anthropology Ph.D. into hands-on action through the nonprofit group she heads. Her passion to bring practical improvements to rural Tibetan villages has resulted in schools, libraries, community centers, sustainable tourism, new opportunities for women, and stronger communities—transforming possibilities for a new generation.*

*"My work in rural Tibet, through the nonprofit Machik, supports and creatively expands strategies for education and sustainable development. By building common ground across many socioeconomic and cultural boundaries, our projects have taken off in ways we didn't anticipate. We built a school in a rural village where there was virtually no literacy, and within a year it became the top school in the county. This shows that given the right resources and support, Tibetans can shape their own futures and connect to a larger world."*

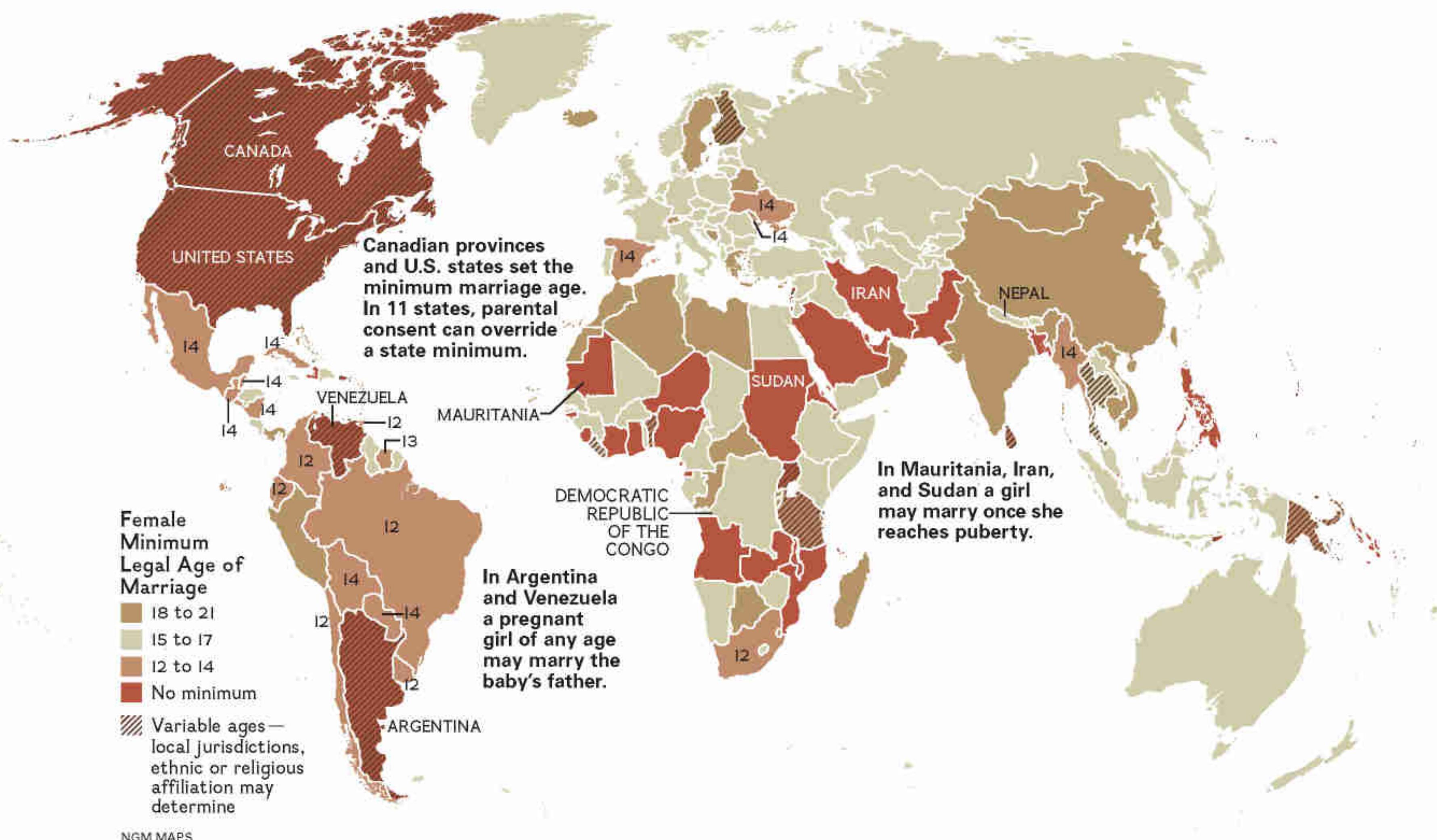
*Losang Rabgey, Gender Anthropologist and Tibetan Social Entrepreneur*

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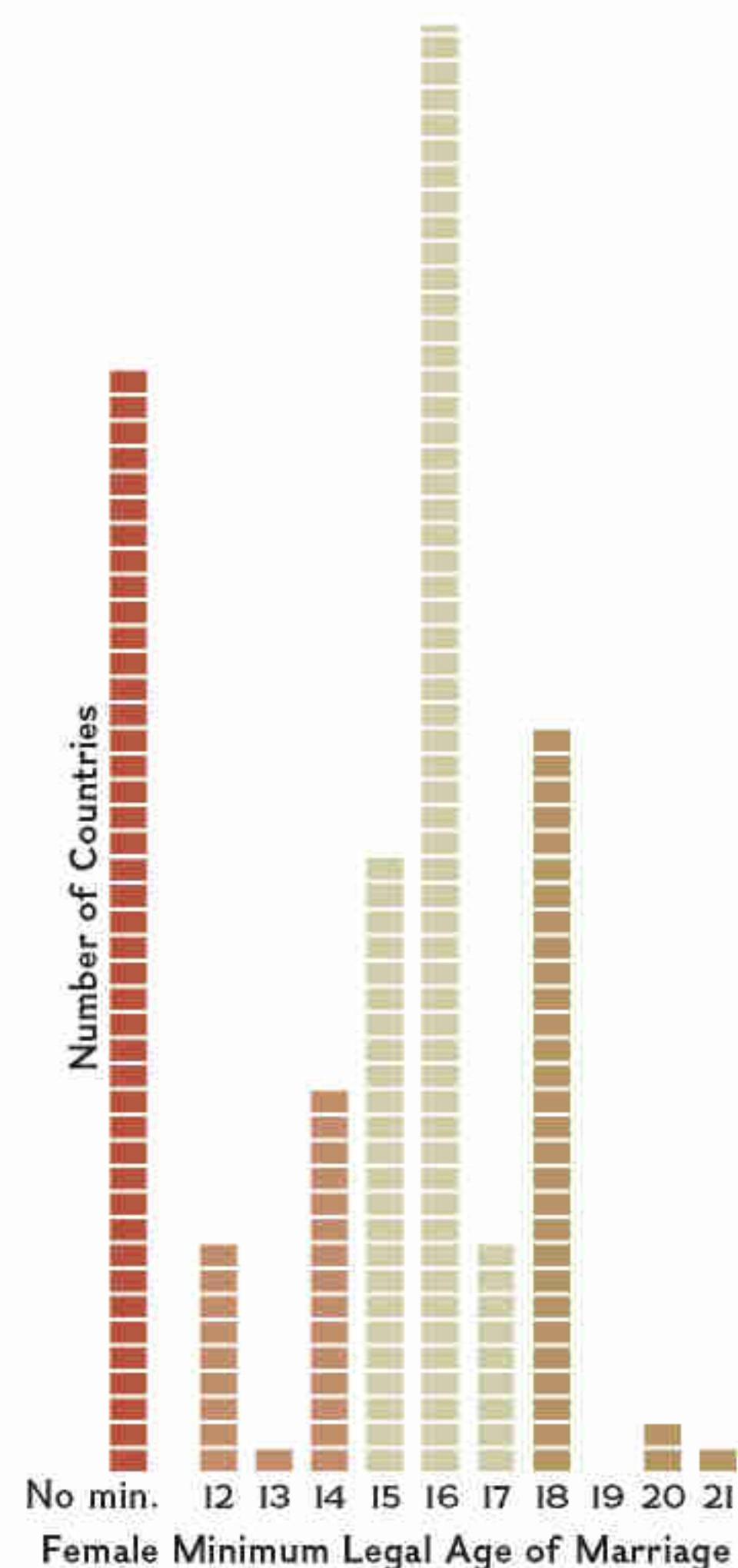


## Marrying Young

Where food is scarce and violence common, parents may try to cope by marrying their daughters off—usually to much older men—as soon as the girls enter puberty. But the marriages themselves can harm the young brides. Such unions often end girls' educations and trigger significant health risks: Pregnancy is the number one cause of death worldwide among girls between the ages of 15 and 19. And a child is statistically likely to be born within the first two years of marriage.

The number of girls facing these risks is staggering. In the Democratic Republic of the Congo, for instance, 74 percent of girls ages 15 to 19 are married. In Nepal, 7 percent of girls are wed before they turn 10. Throughout sub-Saharan Africa girls' and women's chances of contracting HIV substantially increase after they marry.

International human rights standards set the minimum age for marriage at 18. Many countries, though, permit individuals under 18 to marry with parental consent. Often child marriages occur without regard for statutory law. Still, Adrienne Germain, president of the International Women's Health Coalition, which campaigns against early marriage, says a slow wave of change is building. "What you find today," she says, "are older siblings—brothers as well as sisters—standing up for the younger generation and standing against these practices." —*Siobhan Roth*






# LIFE TAKES SURPRISES

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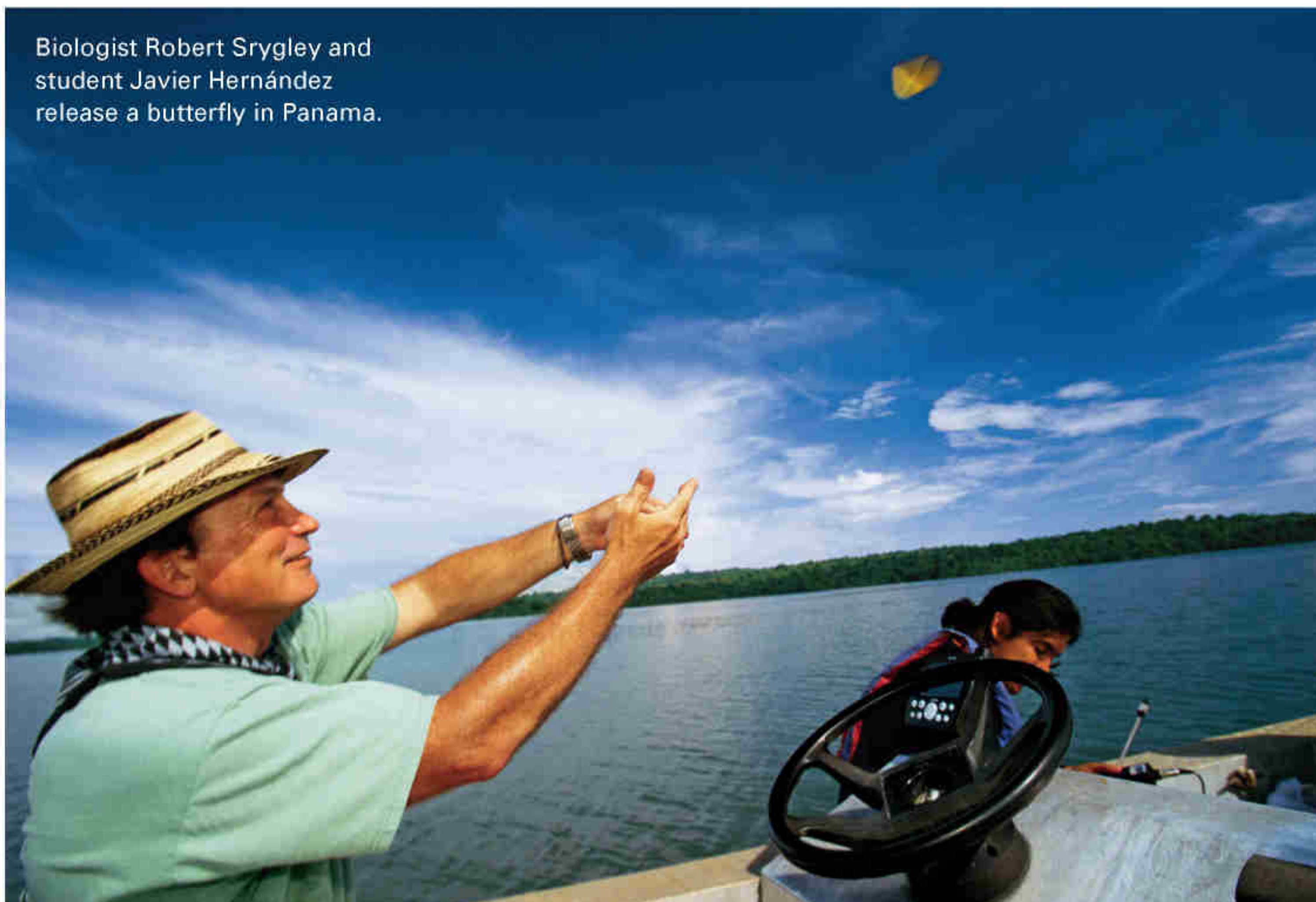
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Biologist Robert Srygley and student Javier Hernández release a butterfly in Panama.

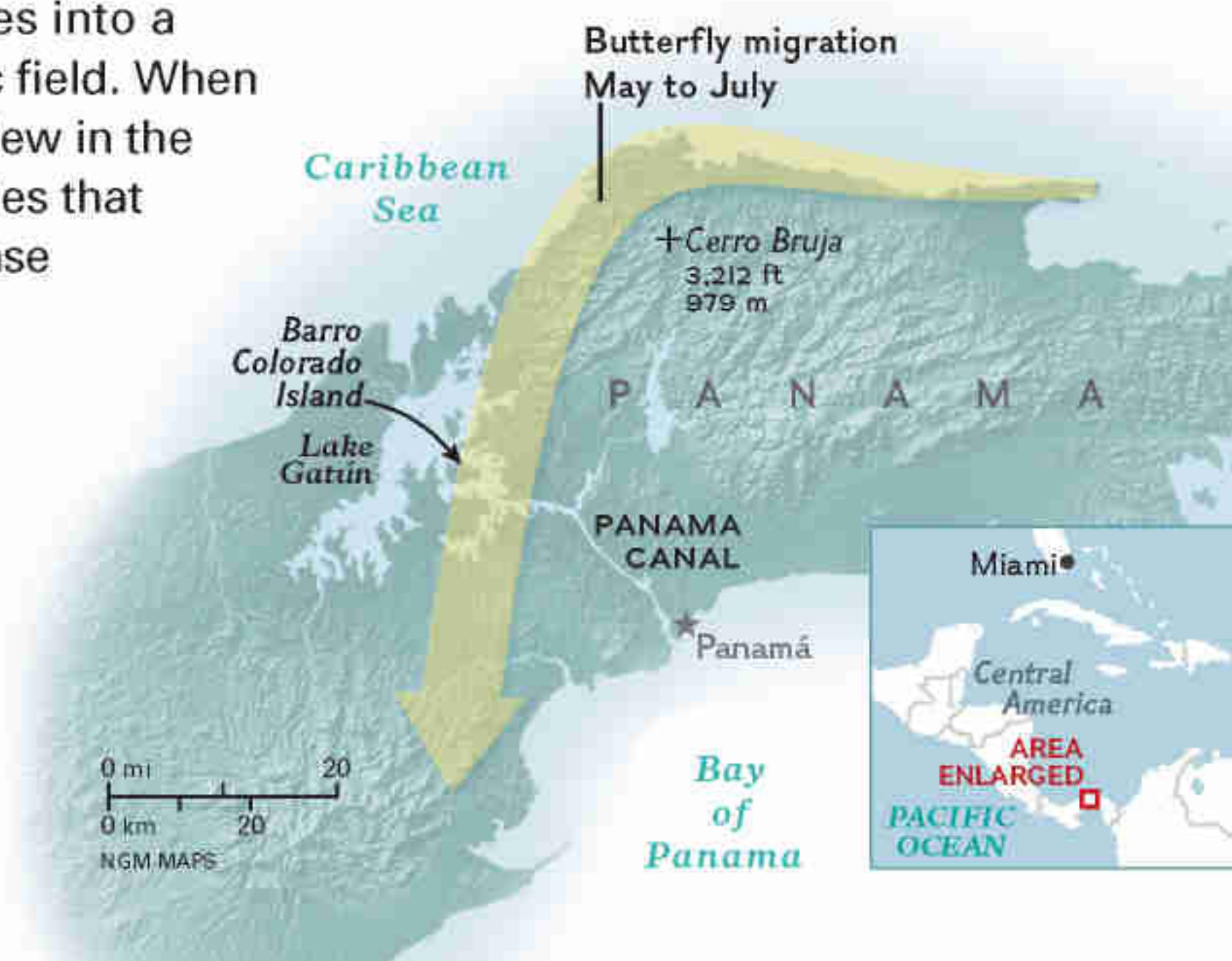


**NG GRANTEE Butterfly Magnetism** Biologists have known for years that tropical butterflies use the angle of the sun against the horizon to guide them on their annual migration from Panama's Caribbean coast to the Pacific. But how do the insects navigate when the sun is nearly overhead? Biologist Robert Srygley suspected they might also be using the Earth's magnetic field like a compass. With a grant from National Geographic, he tested the theory.

Over the course of three butterfly migrations, which run from May to July, Srygley and his research assistants captured *Aphrissa statira* butterflies that were flying south over Panama's Lake Gatún. Each day at noon, when the sun's position offers no directional clues, the team released a group of butterflies into a covered cage surrounded by a weak electromagnetic field. When researchers reversed the magnetic field, the insects flew in the direction opposite their migratory path. And butterflies that were exposed to a strong magnetic field before release scattered more than those that were not. In both tests, control groups of butterflies that hadn't been exposed to the electromagnets followed their correct migratory route. "There's no denying the magnets' effect," says Srygley. "It's very likely the butterflies use the Earth's magnetic field as a guidepost." —Carol Kaufmann



This tropical butterfly may navigate by using Earth's magnetic field.







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## When Science and Politics Clash

Last fall, many people asked a simple question: Did global warming cause Hurricane Katrina?

Here's a complicated answer: Global warming hasn't caused any specific storm. There is no evidence that it has changed the number of hurricanes. But there is new data showing that, as seas have warmed in recent decades, tropical cyclones, such as hurricanes, have become more intense. So no, but yes.

But before anyone fires off an angry email, we need to remember that global warming is both a scientific and a political topic, and science and politics don't mix well. Science deals with tentative conclusions, and politics in absolutes. Science is invariably an enterprise built on uncertainty, and people who make policy decisions see uncertainty as a reason to do nothing at all (or to demand more studies).

Journalist Bill McKibben, writing recently in the *New York Review of Books*, laments the "overhedged" scientific reports about global warming and argues that journalists in general have "proved unequal to the task of separating scientific consensus from minor or trivial dissent." In almost any debate that incorporates science, they tend to give equal time to both sides of every argument

(which is like giving five minutes to those who say the Earth is round and five to those who say it's flat). It happens with the whole issue of global warming. Almost all scientists are persuaded that human activity is altering climate in a perceptible way. But there's always a maverick voice demanding airtime and ink.

Now consider hurricanes again. In the fall of 2004, after four hurricanes had struck Florida, Kerry Emanuel, an MIT climatologist, said that there was no evidence that hurricanes were either more numerous or more intense. But there was evidence—buried in unexamined data. Emanuel found it himself over the next year. "I hadn't looked at the data carefully enough," Emanuel says. "We believed that if there was a global warming signal, it wouldn't be detectable yet in the data."

In August 2005, just before Katrina, Emanuel published a paper showing that since the 1970s there has been a marked increase in the intensity and duration of tropical storms, including North Atlantic hurricanes. Then in

September, right after Katrina, a different group of scientists published similar findings.

Theories are always being tested. This is just how science works. All the more reason for citizens to become as scientifically literate as possible—to figure out where the center of gravity is in any given debate. Because at some point, a scientific civilization has to take action, uncertainties notwithstanding.

"At what point in the evolution of uncertainty does one choose to act?" Emanuel asks. Good question. How about now.



Joel Achenbach is a staff writer for the *Washington Post*.





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**V** O I C E S







# Edward O. Wilson From Ants, Onward

INTERVIEW BY TIM APPENZELLER

*Edward O. Wilson sits across the hall from a million of his close friends. Four floors up in Harvard's Museum of Comparative Zoology, his office is steps from what he calls "Grand Central Station for ants"—a room packed as tightly as an ant colony with pinned specimens from perhaps 6,000 species. In the half century since he left his native Alabama, Wilson, 76, has woven multiple careers—conservationist, evolutionary biologist, theorist of human nature—into one. He also has written 20 books, two with his longtime collaborator, Arizona State University professor Bert Hölldobler. At the root of it all are decades of research on ants and their complex societies. When a young scientist walks into his office with a box holding a dozen new species from South America, his eyes light up and his first love is clear.*

## **How did you develop a passion for nature?**

When I was nine years old and living in Washington, D.C., I somehow got excited about the idea of expeditions to far-off jungles to collect the sorts of things you saw in NATIONAL GEOGRAPHIC. So I decided I would do some expeditions to Rock Creek Park, and I got bottles and everything, and I started collecting there. I would go on my own and wander for hours. Then I went to the National Zoo, which was paradise on Earth for me. How could you avoid becoming a naturalist in that kind of environment?

## **Is that kind of exploration a rarer experience for kids today?**

I worry about that. I have no data, but it appears to me that many of our young people are staying at home or being influenced by an increasingly stimulating artifactual world. Fake nature, sci-fi movies, videos, being drawn into lives that are pursued in front of a computer. That's a trend that would take young people away from a naturalist's experience. But there are counterinfluences. More people go to zoos in the U.S. than attend professional sports, did you know that? There's a strong pull remaining that I think is primal.

## **Darwin loved beetles. What was it about ants for you?**

Originally I was going to work on flies, because I felt that was a wide-open area to do exploration, but I couldn't get the special insect pins to collect them. It was 1946, just after the Second World War, and those pins were not available. So I turned to ants, because I could collect them in bottles of alcohol.

Edward O. Wilson, now 76, discovered the first fire ant colony in the U.S. at the age of 13.



We're just beginning exploration. For animals, we probably know as few as ten percent of the species.... I estimate that maybe half the ants in the world remain undiscovered.

**Do some say that this isn't serious science—it's just collecting?**

Well, when people say that sort of thing, you can respond quickly that you're not going to get anywhere until you do this science, and furthermore, you're going to make all sorts of new discoveries while you're doing it. You never know when someone is going to be looking for some kind of lead in this growing body of information from mapping life on Earth. For instance, someone might say, "What I need for my work is an ant that hunts underwater and walks around submarine fashion and then comes out and goes back to a dry nest. Does any such thing exist?" It turns out, yes!

**A submarine ant?**

Yes, in Malaysia, on the pitcher plant *Nepenthes*. This plant collects water in which insects fall and drown, and there are substances in the water that help digest the insects. *Nepenthes* gets organic material from the insects it captures. There is this ant that lives on *Nepenthes*, and the workers walk in, right down into the mouth of hell. They just walk right in submarine-like, and pick up insects that have fallen to the bottom.

**Are you doing any field trips these days?**

I get together with younger ant specialists—they all seem younger to me, these days—and we go into the field. It's a joyous activity. On a recent trip to the Dominican Republic we went to 8,000 feet. Most people don't know the Dominican Republic has mountains. We were all the way up in cold pine forests, discovering new species at every mountain site.

**There's no feeling that the world has been conquered now?**

Oh, no. That's the point—we're just beginning exploration. For animals, we probably know as few as ten percent of the species. Even in a fairly familiar group like ants, we're discovering them right and left. I estimate that maybe half the ants in the world remain undiscovered.

**How well did Darwin know his ants?**

Darwin knew his ants very well. He spent a lot of time watching ants. And part of the reason was that ants exemplified a peculiarity that he said might have proved fatal to his theory of evolution. And that potential flaw was that worker ants are so completely different from queen ants, yet they are sterile. So how would you explain that by natural selection? If worker ants couldn't have offspring, how are their traits developed and passed on?

**The problem was how this kind of self-sacrifice—tending the queen while giving up reproduction—evolved?**

Yes, and Darwin solved the problem: What counts is the group, and that worker ants are just part of the colony, just an extension of the queen. Her heredity is what matters. If she is producing separate organisms that serve her purpose, then all together,





JOB DESCRIPTION:  
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Dr. Sylvia Earle's office covers two thirds of the Earth's surface. Her job is a little more difficult to define. Marine biologist. Oceanographer. Botanist. Aquanaut. And explorer. She's spent more than 6,000 hours underwater, discovering things we never knew existed. At 1,250 feet, she set the world record for the deepest untethered, solo ocean dive. To Dr. Earle, it was just one more thing in the endless pursuit of science.



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The weight of all the ants in the world is roughly the weight of all the humans, to the nearest order of magnitude.

these colonies can prevail over solitary individuals. That was the solution. And actually that isn't too far from the way we see it today. The most recent theories will be spelled out in detail in a book that Bert Hölldobler and I are now finishing and hope to have in print soon called *The Superorganism*.

**Why that title?**

The colony is the next level of biological organization. The colony, by group selection, has developed traits that could not be possible otherwise—communication, the caste system, cooperative behavior. It's a unit of activity and of evolution. One colony against another is what's being selected. This happens to be close to Darwin's idea but in modern genetic terms.

**How does this kind of social behavior get started?**

It has to do with defense against enemies. Naturalists have discovered more and more groups that have altruistic workers and soldiers—ants, termites, certain beetles, shrimp, and even a mammal, the naked mole rat. What's consistently the case is that these animals have a resource, usually a place to live with food, that's very valuable. If you're a solitary individual and you build a chamber like that, somebody could chuck you out. The idea is that these lines are going to find it advantageous to develop sterile castes for maintaining and protecting the colony.

**So this is a story about community and home.**

I've learned my lesson about jumping from ants or sponges to humans! But it does, in my opinion, call for another look at human origins. Anthropologists now pretty much agree that a major factor in human origins was having a habitation, a campsite, which allowed for some specialization, where some stayed and looked after the site and the young and so on, while others ventured out to bring food back. And the pressures from predators must have been pretty intense.

**But we don't have sterile castes.**

No, we have a division of labor. That is very true. And that's a fundamental difference between us and insects and these other creatures, and that's why we have to be very careful about drawing analogies. Because human beings are so flexible and intelligent, we can divide labor without physical castes.

**That system has worked pretty well for ants.**

They dominate ecosystems. In tropical forests, from one study, ants alone make up four times the weight of all the land vertebrates put together—amphibians, reptiles, birds, mammals. The weight of all the ants in the world is roughly the weight of all the humans, to the nearest order of magnitude. They are the principal predators of small animals, the principal scavengers in much of the world, and the principal turners of the soil.



# Physical Map of Australia



## So what makes an 'Expert'?

It's 400 years since westerners first landed in Australia, and yet we still don't know the full story about this amazing continent. While we've all heard about the famous hotspots of Sydney, Melbourne and the Gold Coast, what about the undiscovered gems in between?

Ask a local about the area where they live and you'll start to get a very different view of Australia. Place names that sound strange to us are logical once you know the story behind them – all you have to do is talk to an 'expert'.

However, we're not referring to academics with endless letters after their name. The true specialists here are people who've lived in these places their whole lives.

In this, the first of a series of features looking at Australia's real experts, we present two maps: the first details the country as we're used to seeing it, while overleaf, you'll find a map showing the true-blue treasures off the beaten track.

What's more, we've detailed the colourful history behind the names of these destinations, based on reports from our 'experts', on the ground...



INDIAN  
OCEAN





Arafura Sea

Torres

Timor  
Sea

Darwin

Katherine

Gulf of  
Carpentaria

NORTHERN  
TERRITORY

Mount Isa

QUEEN

WESTERN AUSTRALIA

A U S T R A L I A

SOUTH  
AUSTRALIA

Lake  
Eyre

Kalgoorlie

Broken Hill

NEW  
V

Great

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It may turn out that highly evolved societies with this level of altruism tend strongly to divide into groups that then fight against each other. We humans are constantly at war and have been since prehistory.

**It's interesting that ants and humans are both social and that both dominate their environment.**

Sure enough, we're the one highly social vertebrate with altruism and high levels of division of labor, though not sterility, unless you want to throw in the priestly caste—which you might. We're the one species that has reached this level, and we dominate.

**We also have a tremendous effect on other species.**

More than any kind of ant. But I'm always at risk of having it said, "That nut wants to compare ants and humans." Well, obviously not. Beyond the fact that we both reached high levels of social behavior based on altruism and division of labor, the resemblance between humans and ants pretty much comes to an end. For example, they communicate almost entirely by taste and smell. They live in a sensory world that's totally different from humans. It's like ants are from another planet. And ants are constantly at war. Well, so are we! But they are the most warlike of animals.

**It makes you wonder whether war and complex societies go together.**

It may turn out that highly evolved societies with this level of altruism tend strongly to divide into groups that then fight against each other. We humans are constantly at war and have been since prehistory. I know a lot of people would like to believe that this is just a nasty habit we developed, just a cultural anomaly, and all we have to do is get enlightened and drop it. I hope that's true.

**Do the ants offer any lessons?**

At least not any we would care to put in practice. Ant colonies are all female; males are tolerated only part of the year. Slavery and cannibalism are commonplace. There is one lesson we have already learned, however: ants keep themselves fanatically clean so epidemics are rare.

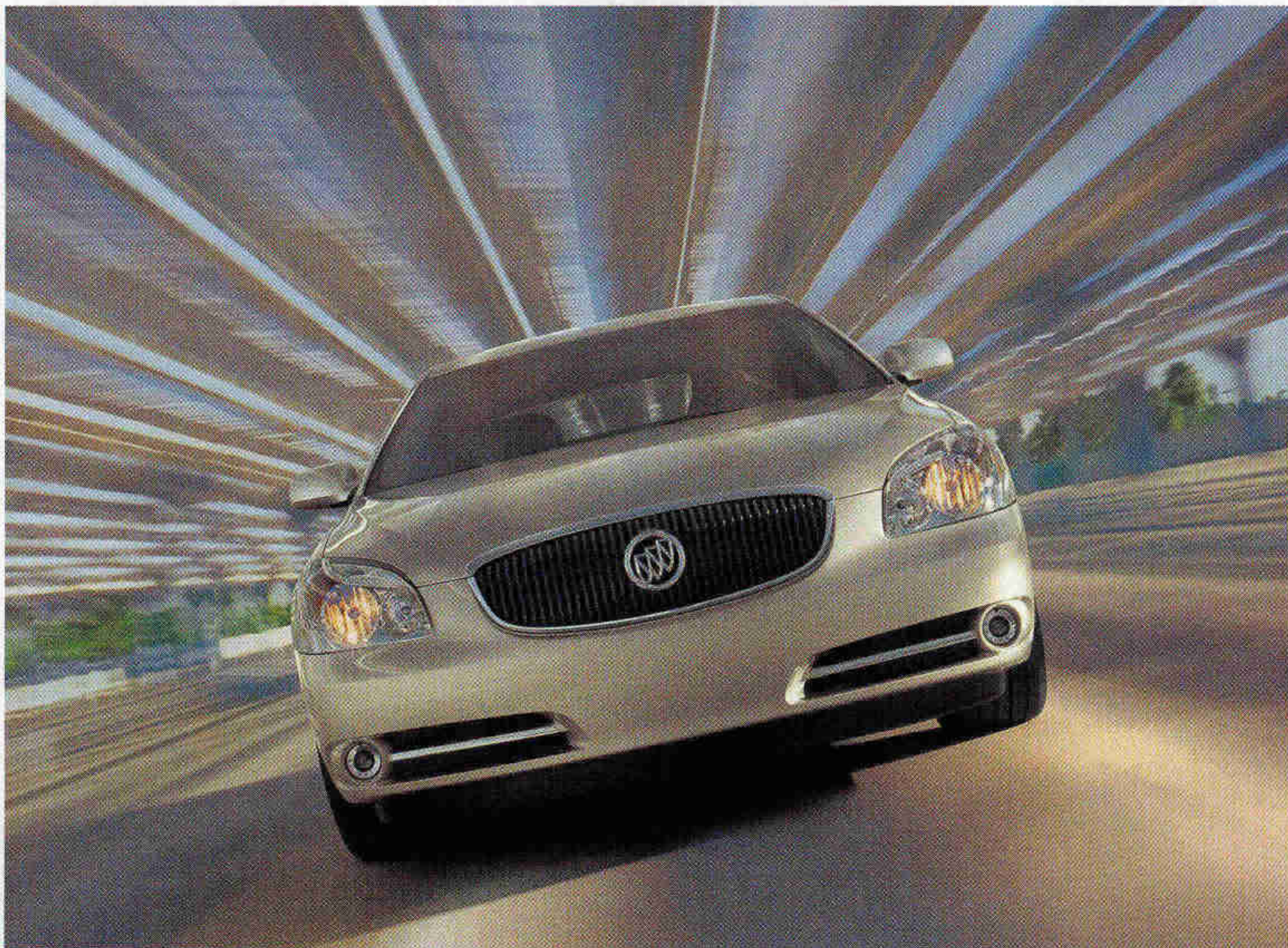
**But now ants and many other creatures are threatened with extinction. Are you hopeful that we can save enough in time?**

Actually, I am. The best funded global conservation organizations are now scoring successes in persuading developing countries to set up sustainable reserves—sustainable meaning they provide an actual increase in the quality of life for people living in and around them. That doesn't take as much money as some have thought. It can be achieved in many of these countries where the greatest destruction is occurring because incomes may be just a few hundred dollars a year. There are reasons to believe that where most of the biodiversity occurs, the tropical forest, grasslands, and shallow marine areas, a lot can be saved.

**What about climate change?**

That's the elephant in the kitchen. That could be in a very short time the greatest destroyer of biodiversity. Not just through





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I take a very strong stance against the mingling of religion and science, and I join many other scientists in showing that intelligent design is not a scientific theory in any sense of the word.

changing temperature zones but also by changing rainfall—changing forest into grassland, grassland into desert or forest. So climate change is tough to beat, but there are ways. Of course, it would help to reduce greenhouse emissions.

**You grew up in the Southern Baptist tradition. Do you feel you have special insight into the resistance to evolution?**

Yes, I think I do. I went away from the faith, but I can address the religious audience and leaders respectfully. I know the depth of the feeling. I know its great services to humanity. I'm also aware of the terrible divisions it causes. In fact I have another book in progress—now, I'm not promoting books—called *The Creation*, and its subtitle is *A Meeting of Science and Religion*. I take a very strong stance against the mingling of religion and science, and I join many other scientists in showing that intelligent design is not a scientific theory in any sense of the word. But then I say, Let's put that aside. Let's recognize that science and religion are the two most powerful forces in the world, and see if instead of arguing about where life came from, we can devote ourselves to saving it—saving the creation.

**Have you tried those ideas out on the religious community?**

No, I haven't. But I would expect to get engaged. And I'm optimistic because there are already strong movements starting up within most of the denominations, including evangelicals, to pay closer attention to the environment and even insist as a moral issue that we take care of the environment. That could be a powerful force. And that's why I have so boldly titled my book *The Creation*—because we're both talking about the living creation, even if we disagree about how it came about.

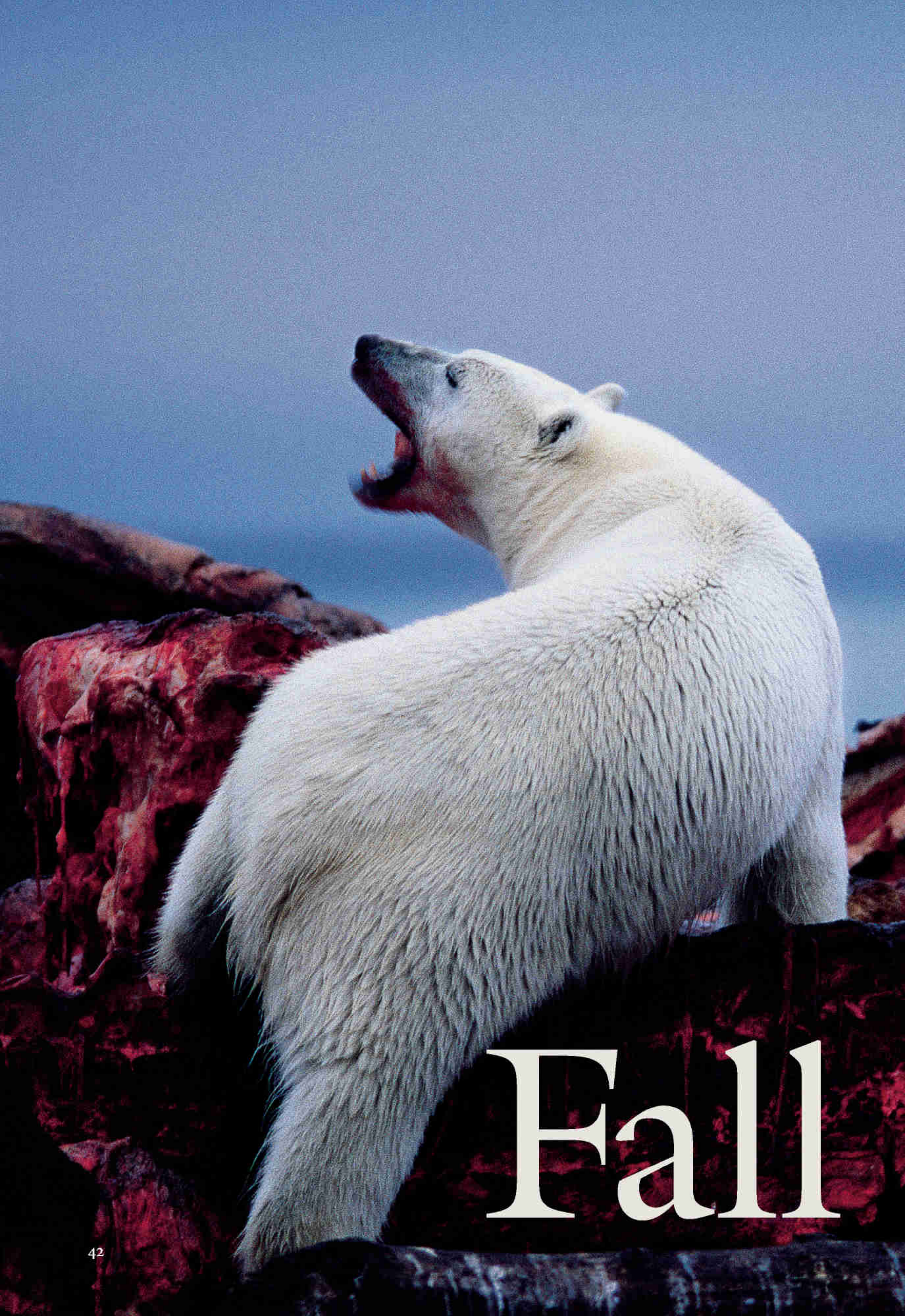
**Obviously you find a spiritual sense in nature, a sense of wonder. How do you find meaning in a world that came about through random mutations and natural selection?**

Well, the human mind has evolved to search for meaning. The universe is so beautiful and complex and surprising, and life is too. You remember Darwin's line, "Endless forms most beautiful and most wonderful have been, and are being, evolved"? We see this far more than Darwin could. We see right down to the molecular level, how truly extraordinary life is as a phenomenon. There you have more to summon spirituality than anything provided by the late Iron Age desert kingdom scribes who wrote the Holy Bible. They created an impressive piece of literature. But they really didn't understand the world around them or the stars above. They metaphorized them, put poetry into them—they did the best they could. But still and all, they fell far short of what humanity is capable of feeling in a sense of the sacred and of aesthetic beauty.

**But ants do some shocking, repellent things.**

I never saw an ant I didn't consider an object of beauty. □





# Fall



A polar bear is seen feeding on the carcass of a bowhead whale in the Beaufort Sea. The whale's ribs and spine are visible, and the bear is positioned on top of the carcass. The scene is set against a clear blue sky.

Our appetite for  
oil threatens to devour  
Alaska's North Slope.

# of the Wild

A polar bear feeds on the carcass of a bowhead whale killed by Inupiat in the Beaufort Sea.





## Alpine Oil Field

The Alpine field shows the oil industry's latest human footprint on the North Slope, a Utah-size swath of tundra that reaches from the Brooks Range to the Arctic Ocean. Located in the Colville River Delta, a breeding ground for waterfowl and shorebirds, Alpine's relentless sprawl is fueling the debate over the industry's impact.













## Arctic National Wildlife Refuge

Caribou from the Porcupine herd dot the uplands of ANWR, which three times last year barely escaped congressional approval to drill within its borders. A critical meat source for bears, wolves, and local natives, this 123,000-member herd (down almost a third since 1989) calves on the refuge's coastal plain.



BY JOEL K. BOURNE, JR.

NATIONAL GEOGRAPHIC SENIOR WRITER

PHOTOGRAPHS BY JOEL SARTORE

**I**n the petroleum-rich wilderness Alaskans simply call “the slope,” big money, power politics, and hype run as thick as the mosquitoes. It is the wildest part of the wildest state, a Utah-size swath of tundra sweeping down from the Brooks Range to the shores of the Beaufort and Chukchi Seas. It is also one of the richest, both in wildlife and hydrocarbons. The sprawling oil fields surrounding Prudhoe Bay produce 16 percent of the United States’ domestic oil supply, along with a whopping 90 percent of Alaska’s state revenues. Some 15 million acres in the middle of the slope, including the

lucrative oil fields, are owned by the state. Much of the rest, save for a few sizable parcels owned by the native Inupiat, belongs to you and me.

Most of our holdings are split between the scenic Arctic National Wildlife Refuge, in the east, and the biggest single block of land in the federal estate, a 23-million-acre chunk of western Arctic known as the National Petroleum Reserve—Alaska, or NPRA. Though it sounds like a massive oil tank that the nation taps in times of need, in reality it contains the largest piece of unprotected wilderness in the nation, along with a half million caribou, hundreds of grizzlies, wolves, and in summer more waterfowl, raptors, and shorebirds than anyone can count.

Biologists have argued for decades that areas of the petroleum reserve are more critical to wildlife than the actual wildlife refuge. But because it’s also believed to hide large deposits of oil, natural gas, and coal, federal and state biologists have been warned to hold their tongues. While the battle over drilling in the refuge raged in the U.S. Congress, the Bush Administration leased vast tracts of the petroleum reserve and offshore waters to the highest bidder, a process that could transform millions of acres of wilderness into oil and gas fields, and the Beaufort Sea into a frosty Gulf of Mexico. Some of those

leases include critical habitat for the geese, caribou, and bowhead whales that have sustained the Inupiat for thousands of years. With substantial communal lands on the slope, the 5,000 Inupiat scattered among seven remote villages and the town of Barrow stand to become the newest oil barons of the 21st century. But in the process they may lose what makes them Inupiat. Many are none too happy about it.

**N**o village feels more keenly the trade-offs of oil development than Nuiqsut, a cluster of about a hundred homes overlooking the Colville River on the eastern edge of NPRA. The village began as a collection of tents in 1973 when two dozen families from Barrow moved to their traditional hunting and fishing allotments by the great river after passage of the Alaska Native Claims Settlement Act. As is true of many of the tiny villages within the North Slope Borough, most of its residents now live in colorful cookie-cutter HUD houses and enjoy indoor plumbing, a diesel-fueled power plant to keep the lights and TVs on, a modern school, clinic, and fire trucks. Most are employed by the borough—benefits mostly funded by taxes on oil infrastructure.

For 20 years the industrial oil zone was out of





**Moving toward the coast in search of mosquito-shooing breezes, members of the central Arctic herd pass through the Kuparuk oil field, second largest in North America. Although caribou crowd roads and drilling pads to avoid insects, they're rarely hit by vehicles. "Caribou get the right-of-way on the oil field road system," says biologist Dick Shideler.**



While the battle over drilling the refuge raged in Congress, the Bush Administration leased vast tracts of land to the west and offshore waters to the highest bidder.

sight, out of mind. But it's been slowly creeping toward Nuiqsut. The newest oil field, Alpine, which began operation in 2000, is located on native and state land in the river's braided delta eight miles downstream. ConocoPhillips originally touted it as a model of high-tech, low-impact oil development with no permanent roads and the use of directional drilling to tap 40,000 acres beneath two drill sites that would disturb only 97 acres of tundra.

Then the drillers hit it big. Now five new satellite sites are under development. ConocoPhillips received an exemption from the Bureau of Land Management (BLM) to plop one drill pad in the middle of Nuiqsut's subsistence hunting lands. The company wants to build a bridge over a branch of the Colville to another pad, right at one of the village's ancestral fishing spots. With NPRA leases coming on line, Nuiqsut is practically surrounded by drill rigs, ice roads, and seismic teams during the long winter drilling season when heavy equipment can move around the tundra. The activity provides jobs for some in the village, but locals claim it's also pushed the caribou away, forcing them to travel ten or twenty miles farther from home to find meat for the table. Though shareholders in the village corporation each received a dividend of about \$3,000 from Alpine royalties last year, the consensus on the slope and in the village is that Nuiqsut got a raw deal.

"The town is so full of anger," says Bernice Kaigelak, who teaches traditional Inupiat language and skills at the village school. "We're trying to find a balance between subsistence and the Western way of living. There are some areas we don't want them to trash, other areas we'd like them to use. I've come to the point that regardless of what we say or do, they're going to come anyway. If you work with them, you have some control."

Chester Hopson, a young hunter from the

village, showed where the two worlds collide. With September temperatures hovering around freezing and winds whipping across the flat tundra, Hopson launched his 20-foot aluminum skiff into the wide pale-green river frothing with whitecaps. Chester's cousin Anthony Hopson worked at Alpine and wanted to pick up his paycheck, so he, brother Andrew, and their friend Joe Frank Sovalik, all in their late teens and early twenties, came along for the ride.

Soon the skiff was screaming down the bumpy river as Hopson, cheeks beet red from the wind, deftly steered through the shoals. After a few miles, a gray rectangle of gravel rose on the right bank six feet or so above the tundra. Shipping containers were stacked on the pad, ready for drilling season in the coming winter.

A drill was boring away downstream at the next pad, rising like a rust red lighthouse amid a tawny sea. Anthony's paycheck awaited in the office, so Chester nosed the boat onto a mud-flat dotted with the odd grizzly and caribou track, and the young men hiked the remaining half mile across the spongy tundra. Behind them the vast coastal plain stretched without relief to the horizon. The scene was oddly beautiful, almost eerie, instilling an unsettling, yet exhilarating, feeling of endless emptiness. A solitary loon bobbing in the shallows was the sole reminder of this seasonal illusion. During the summer breeding season the Colville Delta teems with wild things, including rare yellow-billed loons and spectacled eiders, which are among the species threatened by oil development.

Walking up to the big drill pad, with its blazing lights, bustling trucks, and diesel hum of activity, on the other hand, was like coming out of the desert into Vegas—so incongruous, so starkly out of place that "satellite" seemed an apt description. The young men headed for the residence complex, kicked off their boots in the



mudroom, and parked themselves at a table in the cafeteria while Anthony went for his check. Food is free on the rigs, so the men helped themselves to chips, sodas, and chicken-fried steaks. In winter they bring their mothers here every week for free prime rib or to play bingo. Despite the relative proximity of high-paying jobs, few Inupiat work in the oil fields. Many complain of the two-week shift work, of low-end jobs, or of discrimination. Anthony worked as an assistant fire-watcher—which he says is one of the most boring jobs on the planet. “You just sit and watch somebody weld and make sure nothing catches on fire.” Chester worked on the rigs for about six weeks, and hated it. Now he builds ice roads in winter for Nuiqsut’s native Kuukpik Corporation. A driller dropped by the table to tell the guys about a roustabout job on another rig, but there were no takers.

Back in the boat, Chester and his friends headed a few miles downstream to his grandmother Nanny Woods’s place, a rough plywood shack sitting on the crumbling riverbank. The door was banging open in the wind. The flotsam and jetsam of a typical Inupiat hunting camp lay strewn about: dead batteries, old cookstoves, rusting oil drums, and associated junk. This is their spot, the cousins say, their home away from home. Here they escape the growing pressures of Inupiat life, the constant buzz of four-wheelers, the incessant drone of TV, the boredom of the village, and just hunt, fish, and be free.

“The caribou herd used to come here,” Chester said. “Hardly does anymore now that this pipeline is here. Oil is a good thing for the jobs, but it changes things.”

“Man, I love it when the herd runs,” Joe Frank said. “You can feel it in the ground just like *Dances With Wolves*.”

There are other sounds now. They can hear

the rig from here, the generators, the planes, the helicopters, and a garbage-truck-size vacuum cleaner—a “super-sucker”—for cleaning up spills. “OK,” I said, “pretend I’m ConocoPhillips. I’m offering each of you ten million dollars for this cabin and the land around it. Any takers?” To a man, each said no.

“How far will ten million take you?” Andrew asked. “You can go to Vegas and blow ten million dollars in a year. But can you still come out here? This place is priceless.”

“We get more from this place than money,” added Joe Frank. “The land feeds you. We’re rich as long as we’ve got the land.”

As they left the shack, one of the men pointed to a lone wooden marker jutting from the tundra. “See? Our grandpa George Woods. He’s buried over here.” One has to wonder if that old Inupiat knew when he picked that spot that one day he’d be listening to super-suckers for eternity, or at least until the oil runs out.

**T**oday it’s the hunting lands of Nuiqsut. The next stop on the oil industry’s wish list—based on where it is putting its money—isn’t the coastal plain of ANWR, known by its government label as the 1002 Area. It’s Teshekpuk Lake. The largest freshwater body on the slope sits in the most controversial chunk of NPRA to go on the auction block, some 4.6 million acres known officially as the Northeast Planning Area. The lake and its swampy borders, laced with creeks and potholes, have long been considered one of the most important molting areas for geese and other birds in the Arctic. A third of the world’s black brant, for example, lose their flight feathers near the lake, along with tens of thousands of Canada geese, white-fronted geese, snow geese, and tundra swans. It’s also the calving grounds for some 45,000 caribou known as the Teshekpuk (Continued on page 70)



[Teshekpuk Lake]



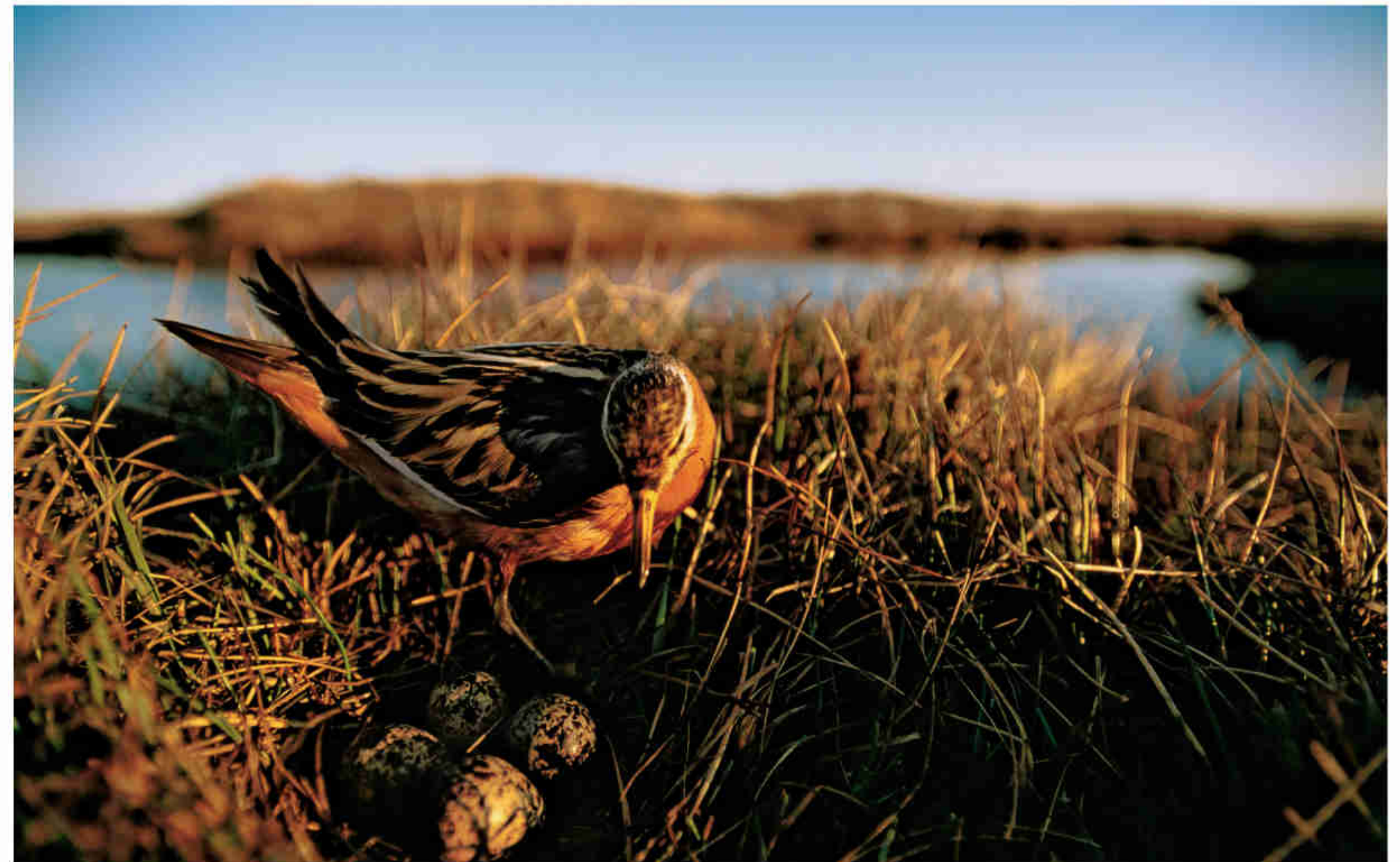




**Black brant (left) gather near Teshek-puk Lake, one of the most important habitats in the Arctic for these birds. To the west near Atqasuk, a molting white-fronted goose (right, top) struggles to fly. Because they lack flight feathers, molting birds are vulnerable to predation by arctic foxes, which thrive in the oil fields. Up in Barrow, a red phalarope (right) tends its nest. All three habitats are now open to oil and gas exploration, and some of the proposed drilling sites have the slope's highest densities of shorebirds and waterfowl.**



ATQASUK



BARROW



# The Selling of Alaska

Some see Alaska's North Slope as a lush ecosystem worth protecting. Others see it as a storehouse of oil—up to 48 billion barrels—waiting to be tapped. The latter view is gaining ground. The Arctic National Wildlife Refuge has been at the center of the debate, but development is spreading rapidly westward. Shaded blocks on this map represent tracts of land or ocean that are leased for oil and gas exploration; open blocks show tracts that are available for leasing. Both the federal government and the state can issue leases, which range in size from a few hundred acres to nearly 15,000. Leases have jumped dramatically over the past five years: Since 2001 in the NPRA alone, energy companies have paid 120 million dollars to lease nearly two million acres. If sites prove promising, oil and gas wells (red dots) may spill farther across the slope—and the lost wilderness may be remembered as the cost of doing business.

📍 **Oil vs. Wilderness** Explore an interactive version of this map at [ngm.com/0605](http://ngm.com/0605).

## CHUKCHI SEA PLANNING AREA

The federal government plans to open up this remote 34-million-acre area to leasing within the next few years.

## Whales

Some 10,000 bowhead and more than 30,000 beluga whales migrate along the North Slope coast.

## Caribou

Almost 700,000 caribou use the coastal plain and the western uplands for calving, traveling hundreds of miles each spring from wintering grounds in Canada and the U.S.

Western Arctic caribou herd 490,000

## NATIONAL PETROLEUM RESERVE-ALASKA

The NPRA consists of 23 million acres of federal land split into the Northwest, Northeast, and South Planning Areas. The southern section is the only one off-limits to leasing pending the completion of an environmental impact statement.

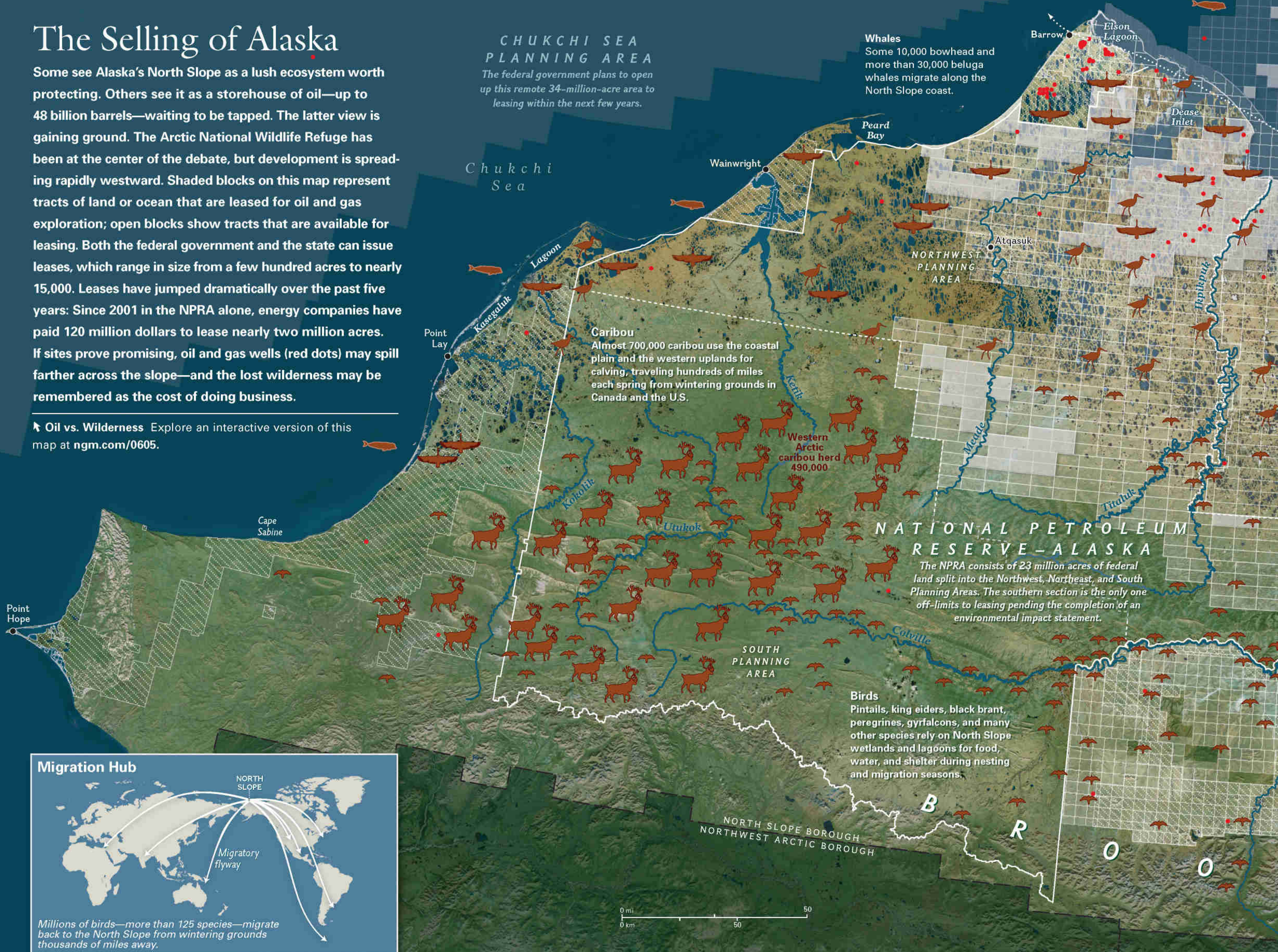
## Birds

Pintails, king eiders, black brant, peregrines, gyrfalcons, and many other species rely on North Slope wetlands and lagoons for food, water, and shelter during nesting and migration seasons.

## Migration Hub



Millions of birds—more than 125 species—migrate back to the North Slope from wintering grounds thousands of miles away.





Beaufort Sea



**Teshkepuk Lake**  
Last January the Bureau of Land Management opened this wildlife-rich area to oil and gas leasing.

**Barrow Arch**  
This geologic formation along the coastline traps a wealth of oil—almost every oil discovery on the slope has been within 20 miles of it.

**Alpine Field**  
This newest field, which began operation in 2000, is spreading into the Colville River Delta, a breeding ground for waterfowl and shorebirds.

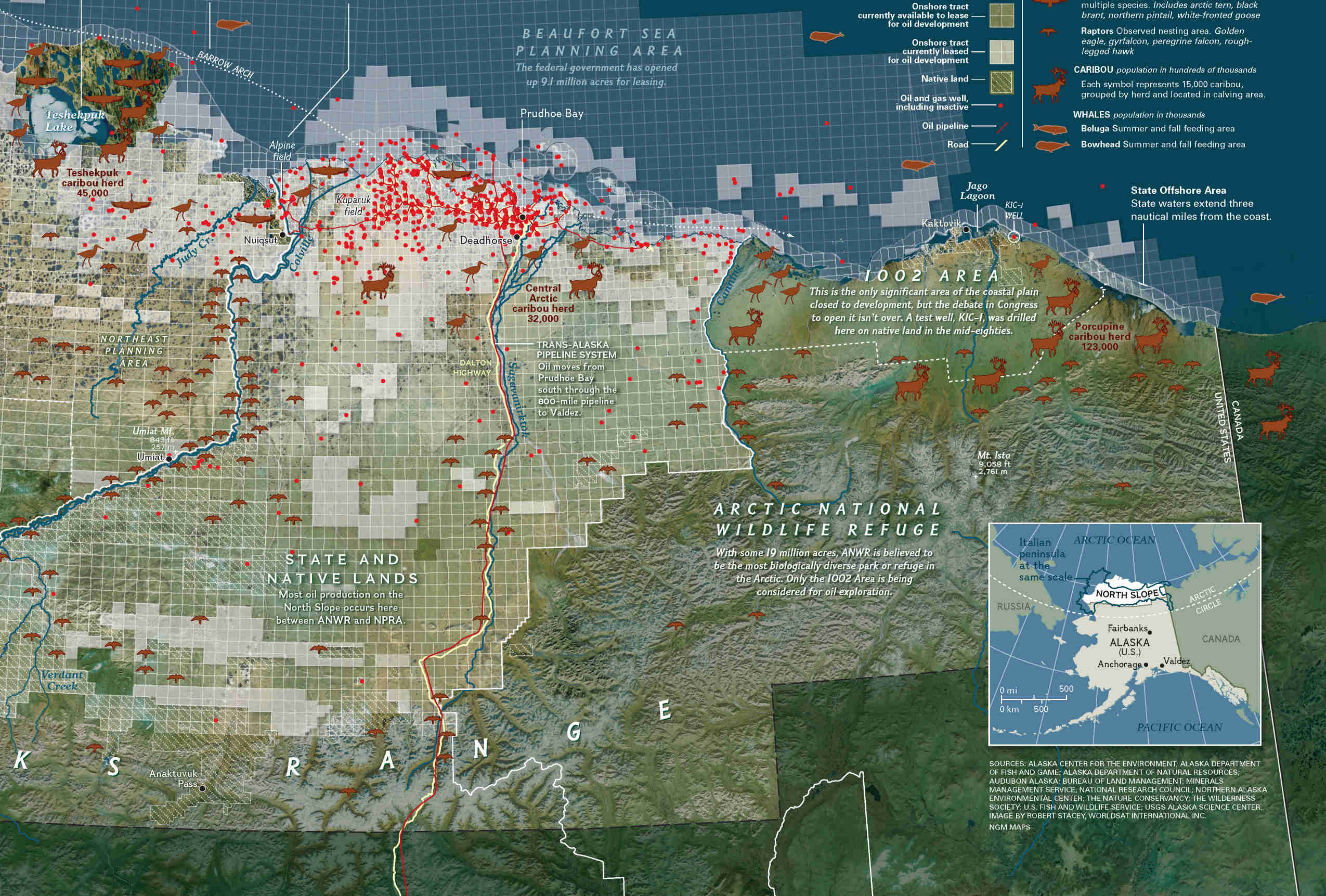
**BEAUFORT SEA PLANNING AREA**  
The federal government has opened up 9.1 million acres for leasing.

**OIL DEVELOPMENT**

- Offshore tract currently available to lease for oil development
- Offshore tract currently leased for oil development
- Onshore tract currently available to lease for oil development
- Onshore tract currently leased for oil development
- Native land
- Oil and gas well, including inactive
- Oil pipeline
- Road

**WILDLIFE HABITAT**

- BIRDS** population in millions
- Shorebirds** High-density breeding area, four species or more. Includes American golden plover, dunlin, red phalarope, semipalmated sandpiper
  - Waterbirds** High-density breeding area, multiple species. Includes arctic tern, black brant, northern pintail, white-fronted goose
  - Raptors** Observed nesting area. Golden eagle, gyrfalcon, peregrine falcon, rough-legged hawk
- CARIBOU** population in hundreds of thousands
- Each symbol represents 15,000 caribou, grouped by herd and located in calving area.
- WHALES** population in thousands
- Beluga** Summer and fall feeding area
  - Bowhead** Summer and fall feeding area



Prudhoe Bay

**TRANS-ALASKA PIPELINE SYSTEM**  
Oil moves from Prudhoe Bay south through the 800-mile pipeline to Valdez.

**1002 AREA**

This is the only significant area of the coastal plain closed to development, but the debate in Congress to open it isn't over. A test well, KIC-1, was drilled here on native land in the mid-eighties.

**NORTHEAST PLANNING AREA**

**STATE AND NATIVE LANDS**

Most oil production on the North Slope occurs here between ANWR and NPRA.

**ARCTIC NATIONAL WILDLIFE REFUGE**

With some 19 million acres, ANWR is believed to be the most biologically diverse park or refuge in the Arctic. Only the 1002 Area is being considered for oil exploration.



SOURCES: ALASKA CENTER FOR THE ENVIRONMENT; ALASKA DEPARTMENT OF FISH AND GAME; ALASKA DEPARTMENT OF NATURAL RESOURCES; AUDUBON ALASKA; BUREAU OF LAND MANAGEMENT; MINERALS MANAGEMENT SERVICE; NATIONAL RESEARCH COUNCIL; NORTHERN ALASKA ENVIRONMENTAL CENTER; THE NATURE CONSERVANCY; THE WILDERNESS SOCIETY; U.S. FISH AND WILDLIFE SERVICE; USGS ALASKA SCIENCE CENTER. IMAGE BY ROBERT STACEY, WORLDSAT INTERNATIONAL INC. NGM MAPS



[Verdant Creek]



August brings fall color to a tributary of the Colville River. "I've not been to this area on foot, and it's possible that no one has in modern times," says biologist and bush pilot Pat Valkenburg. "It's the only real wilderness left in the United States."

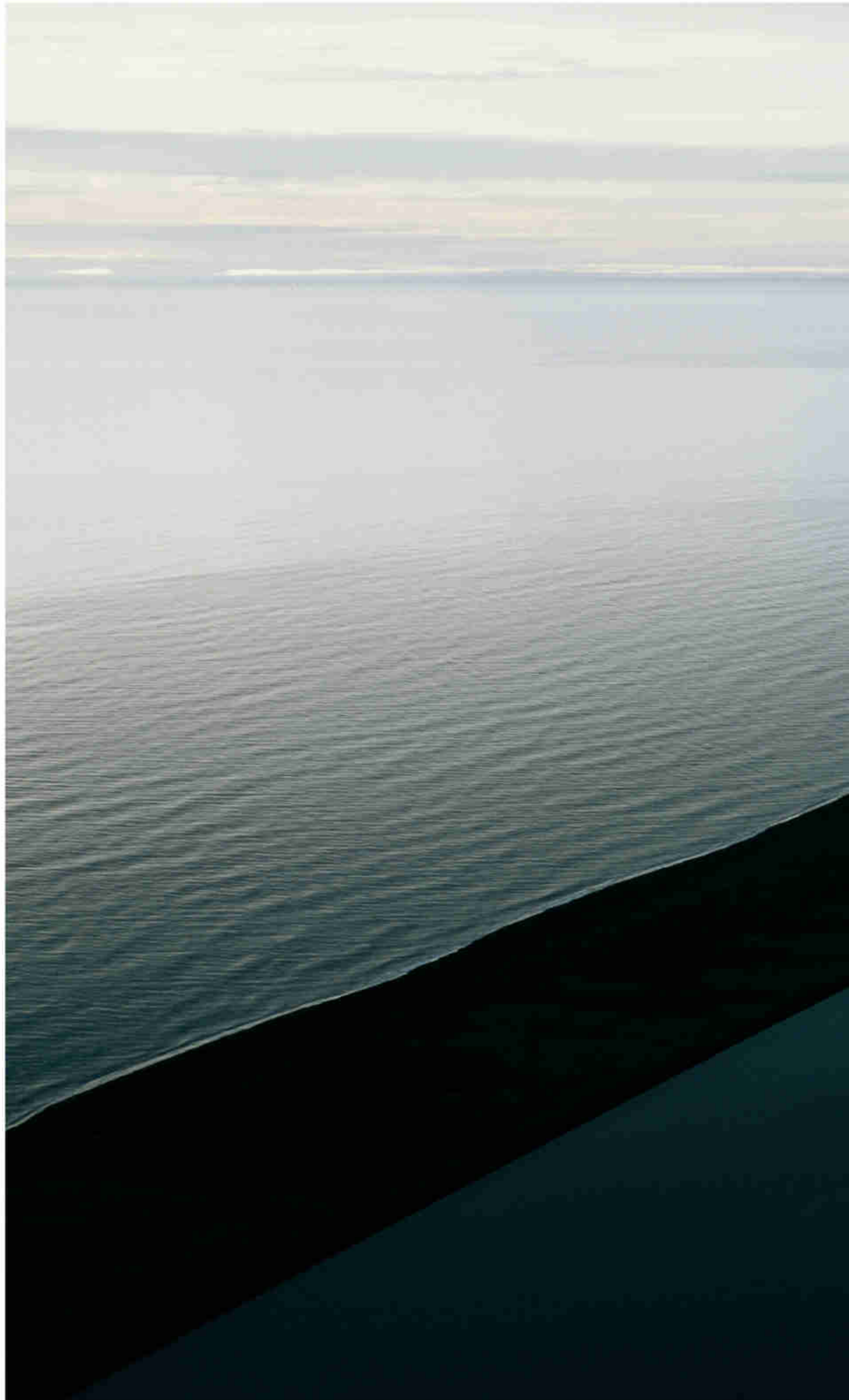






## [Kasegaluk Lagoon]

**A sandbar divides the Chukchi Sea, at left, from Kasegaluk Lagoon, a 120-mile-long sound that sustains birds, seals, and whales. Oil company interest in drilling nearby deposits raises fears that spills may taint Kasegaluk's waters.**













## [Colville River]

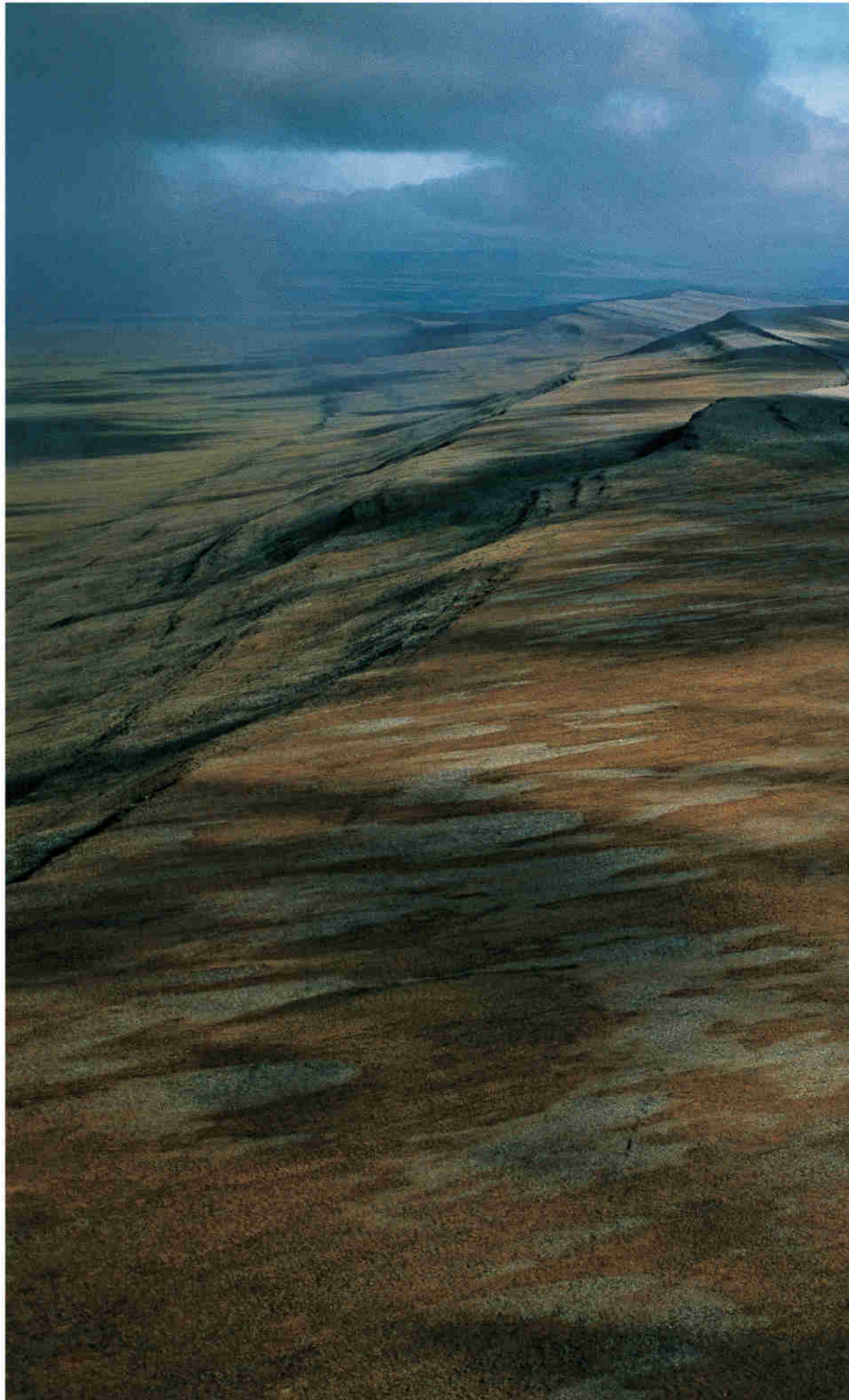


**Two peregrine falcon chicks nest in the National Petroleum Reserve–Alaska, a 23-million-acre tract of land being leased for drilling. The reserve hosts some of the world’s highest densities of raptors, including gyrfalcons and rough-legged hawks.**



## [Utukok Uplands]

**The Utukok River uplands (rich with coal deposits) are the calving grounds for the western Arctic caribou herd—four times the size of the Porcupine herd. “There’s a lot of meat going in,” says biologist Ted Swem, “so a who’s who of predators follows,” including wolves and grizzlies.**









## [Canning River Delta]

**Polygons of fresh water near the coast result each spring from freeze-thaw cycles, creating habitat for loons, waterfowl, and shorebirds. "These areas are far removed from human activities," says a Fish and Wildlife Service biologist. "They need to be protected."**









(Continued from page 51) herd, which serves as a veritable meat locker for four villages. Up to a tenth of the herd ends up on Inupiat tables every year.

“Teshekpuk Lake is God’s country,” said former borough mayor George Ahmaogak, who owns two hunting camps in the area. “Everything can be had there—waterfowl, fish, caribou. We made a good effort to keep that area closed. Now the Bush Administration comes along and says make it all available for leasing.” In 1977 the Carter Administration initially designated the lake as one of three special areas within NPRA for its importance to wildlife, along with the bluffs by the Colville River, which are used by thousands of breeding peregrines, gyrfalcons, and rough-legged hawks, and the Utukok River uplands, calving grounds of the western Arctic caribou herd. That year and again in 1980, Congress instructed the secretary of the interior to ensure that any activity in these areas be conducted to “take every precaution to avoid unnecessary surface damage and to minimize ecological disturbance throughout the reserve.” Even Ronald Reagan’s famously anti-environmental secretary of the interior, James Watt, barred leasing on 200,000 acres north of the lake to protect the geese. When the Clinton Administration decided to open NPRA to oil exploration in the late 1990s, it commissioned an exhaustive environmental impact statement (EIS) for the 4.6-million-acre northeast block. After numerous studies of caribou and geese and countless meetings with villages that depend on game from the area, then-Secretary of the Interior Bruce Babbitt expanded the protection to more than a half million acres, but opened the remaining 87 percent of the Northeast Planning Area to leasing.

Some of the hottest oil prospects, however, were in the protected 13 percent. A geologic

formation known as the Barrow Arch runs near the lake, and almost every commercial oil discovery on the slope has been found within 20 miles of it. The Bush Administration decided to update the EIS, claiming the government had new information on mitigating the impacts on wildlife. Last January, Secretary of the Interior Gale Norton opened the entire area to drilling, except the lake itself. The decision leaves only 6 percent of the coastal plain closed to oil exploration, the piece that lies within ANWR.

“In 1998 we came up with an agreement most of us could live with,” said Geoff Carroll, a long-time wildlife biologist who studies the Teshekpuk herd. “Then it was completely up-ended. Several studies since have reaffirmed the area’s importance as wildlife habitat. The only new information was BLM’s assumption that there’s more oil there than originally thought. All the emphasis and debate has been on ANWR. To me it’s a big distraction as they sweep into this area that is just as important biologically as 1002.”

Part of the dilemma now facing the North Slope and its residents is the permanency of the decisions being made here, largely out of view of the rest of the nation. Oil infrastructure in the Arctic is a bit like the scar you got on the playground as a kid. It may fade, but it never goes away. Take a look at a couple of old wells on a ridge overlooking the storied oil camp of Umiat, a hundred miles upstream of Nuiqsut. It was here in the 1940s and early 1950s that the Navy drilled the first test wells in what was then called Naval Petroleum Reserve Number 4, established by President Warren G. Harding in 1923 as an emergency supply for the military. Umiat’s large remote airstrip was later used as a flag stop for airplanes flying from Fairbanks to Barrow, and as a base for seismic crews who scoured NPRA in great cat-train expeditions during the 1970s and 1980s. Umiat now holds two dubious



Walking up to the big drill pad, with its blazing lights, bustling trucks, and diesel hum of activity was like coming out of the desert into Vegas—so incongruous, so starkly out of place.

distinctions: It's one of the coldest places in the U.S. (average temperature is 10.8°F), and it's the site of a multimillion-dollar toxic cleanup.

A rusting fuel tank and a Christmas tree of valves mark Umiat Well Number 9 near the top of the ridge. From here, on a good day, you *can* see forever. In the distance the land rises in green plateaus and long benches all the way to the rugged Brooks Range to the southeast, while the broad valley of the Colville River opens like a gentle fold in the earth, slowly ascending on one bank to the 800-foot bluff known as Umiat Mountain. It's easy to forget that the military once left thousands of barrels of oil, diesel, DDT, and PCB to rot here. One morning, in bone-chilling rain, six peregrine falcons soared like stealth bombers along that bluff, hunting for the hapless gosling or rodent to feed their hungry chicks. The bluffs along the river provide some of the most important nesting areas in the Arctic for the species.

It's rugged, beautiful, wide-open country, essentially unchanged since woolly mammoths roamed these steppes. It's difficult to imagine it full of pipes, pump stations, and gravel roads. Yet somewhere beneath those foothills lie an estimated 100 million barrels of light, sweet crude—and an estimated 60 trillion cubic feet of natural gas, enough to satisfy the current demand in the U.S. for three years. The camp at Umiat was busy with oil-field geologists and other experts in advance of the next anticipated lease sale in NPRA and the intensive seismic work scheduled for the winter. And federal agencies are still trying to clean up the contaminated soils at Umiat, nearly 60 years after the Navy drilled it.

**O**n a bitter September day with snow blowing horizontally off the Beaufort Sea, BP engineer Scott Digert pointed to an odd steel sculpture rising from the industrialized tundra of Prudhoe Bay. "That's the

discovery well," he shouted to a small group of journalists over the howling wind—the last of a dozen exploratory wells drilled in the 1960s. The first 11 were dry holes, but on the last one ARCO and Humble Oil (now Exxon) hit pay dirt: the largest oil reservoir yet found on the continent. The historic well is now topped by a 15-foot-high ARCO trademark, which Digert explained represents a spark inside a circle, but which looks more like giant crosshairs. Though the company merged with BP in 2000, Digert, a former ARCO man, couldn't help but beam. "Some of us former ARCO employees are pretty proud of that," he said.

Back in '68 Prudhoe was even more remote than Umiat. What started as one drill site covering 65 acres has now sprawled across a thousand square miles with 19 producing fields and 1,860 miles of pipeline, transforming a stretch of tundra the size of Yosemite into one of the largest industrial complexes on the globe. The original find was estimated at 9.6 billion barrels. Prudhoe has already produced 10 billion barrels, and BP and its partners hope to squeeze out several billion more, perhaps extending the field's life for another 50 years.

But the end of oil is in sight. The Trans-Alaska Pipeline System, or TAPS, which transported more than two million barrels a day in 1988, is down to 900,000 barrels a day and dropping 3 percent a year. Alaska Governor Frank Murkowski is clamoring to build a new pipeline to transport the slope's vast reservoir of natural gas to markets in the Midwest and to keep the state's coffers brimming, but so far that remains a pipe dream. Each day Prudhoe produces more gas than Canada burns in a day—some eight billion cubic feet—which is currently reinjected into the oil reservoir to keep the pressure up and the dwindling supply of oil flowing. If the gas pipeline gets approved, it will be one of the largest private



construction projects the world has ever seen and will likely change the face of the slope forever.

For now, BP spokesman Daren Beaudo explained that his company is out of the exploration game on the North Slope. Instead BP is focusing on using the latest technology to squeeze every last drop out of the known formations at Prudhoe, including the estimated 23 billion barrels of heavy viscous oil that remains largely untapped.

At a new state-of-the-art well pad, with some 35 wells clustered together in small beige sheds, veteran operator Dan Hejl broke away from the hum of computers in the control room to open a small tap in one of the sheds out back. He poured about a liter of oil into a plastic container. It looked like a slightly thicker version of Guinness stout, with a gas station bouquet. "Smells like money," Hejl said.

It's hard not to be impressed by what hard work, technology, and an unseemly amount of money has carved out in one of the harshest environments on the globe. But the impacts are equally impressive. In March a corroded BP pipeline caused the largest oil spill in North Slope history—estimated at more than 200,000 gallons—one of hundreds of spills that occur there each year. Giant turbines scream day and night, pumping out more of some air pollutants than Washington, D.C. Perhaps most troubling, there are no plans to clean up the place when the oil and gas are gone. A 2003 report by the National Research Council concluded that because of exorbitant cost and lax oversight, most of the tundra will never be restored—making the stakes in the Arctic National Wildlife Refuge all the higher.

"At this point, the decision to open ANWR has moved into the realm of politics," Beaudo said. "It needs to be decided by the American people. We're not going to try to influence that."

At least not anymore. After spending millions

of dollars lobbying Congress to open up the 1002 Area of ANWR to drilling, BP and other big oil companies have pulled out of the most vocal lobbying group, known as Arctic Power. Perhaps they believe it's time to move to the sidelines. Or perhaps it's just that the holes they've drilled near the refuge have been disappointing, while the holes drilled toward NPRA, with less political pitfalls, have paid off big-time.

**T**he Arctic National Wildlife Refuge may be the only spot on the entire North Slope where the American public hasn't acted like absentee landlords. The folks of the village of Kaktovik, which sits on the coast just north of the refuge, bristle at this notion, because long before it was deemed "the last great wilderness" by conservationists in the 1950s, it was simply their backyard, where they fished, hunted, and camped. Their ancestors' footprints are all over it, and they named every bend of the river, every mountain, every fishing hole. Wilderness, to Kaktovik, implies no people.

The village of almost 300, however—which owns nearly 100,000 acres of potentially petroleum-rich lands within ANWR—has long supported drilling in the refuge, putting villagers at odds with the Gwich'in south of the Brooks Range, who also depend on the Porcupine caribou herd that summers and calves along the coastal plain. The Inupiat are well aware from where the money, the jobs, the school, the power plant, and, just recently, the flush toilets came. With a rancorous debate in Congress under way, journalists from around the world descended on the tiny village last summer, leaving Mayor Lon Sonsalla feeling besieged.

"We want the same thing everybody else wants," said Sonsalla, a former Wisconsin farmer who came up north in search of work, fell in love, and stayed. "A better life for your kids and



“The caribou herd used to come here,” the Inupiat hunter said. “Hardly does anymore now that this pipeline is here. Oil is a good thing for the jobs, but it changes things.”

their kids. You want to be able to control your destiny somewhat. Officially, the town is still in favor of responsible onshore development. Can we stand up to the beast? They’ll have to mind their p’s and q’s here.”

Unofficially, the village seems utterly torn over the issue. Robert Thompson is one of the growing number of residents ardently opposed to oil development in the refuge. A wilderness guide who takes rafters down the shallow, gravelly rivers that tumble from the Brooks Range, Thompson recently circulated a petition against drilling and collected 58 signatures. That’s significant, he said, since only 98 people voted in the last election.

“The governor of Alaska says we’re doing this for the people of Kaktovik, because he doesn’t want us to live like a third-world country,” Thompson said from his easy chair, which was surrounded by guns, bows, and assorted outdoor gear. “We didn’t get the benefits of oil money until after Anchorage got a hundred-million-dollar performing arts center. Twenty-eight years after oil production began, we just got off honey buckets. Go take a good look at that toilet. That’s a million-dollar toilet right there. Most of the North Slope officials advocating for oil development have spent more time in Hawaii than in the refuge.”

Surprisingly, all the arguing between pro-drilling groups and environmentalists over just how much oil actually underlies the refuge—and whether it’s worth destroying its renowned wilderness character—is based on a scant amount of actual hard data. No fewer than eight different assessments of the area’s oil potential have been made by various state or federal agencies since 1986, with numbers all over the map. Almost all are primarily based on a two-dimensional seismic survey done by the industry in the early 1980s. In the most recent study done by the

U.S. Geological Survey in 1998, that data was re-crunched in faster computers with the findings from a handful of new wells drilled along the refuge’s periphery thrown in for good measure. That estimate gave the refuge a 95 percent chance of containing 4.3 billion barrels and a 5 percent chance of containing 11.8 billion barrels, with a mean estimate of 7.7 billion. The oil is now thought to lie in some 35 relatively small deposits scattered mostly in the western section of the 1002 Area, a contention contradicting USGS’s stance in 1986, when most of the oil was thought to lie in the eastern section.

“Trying to estimate the amount of oil or gas is a highly uncertain business,” says USGS’s Kenneth Bird, a project leader for the 1998 study. “That’s why we report our results in terms of probabilities. The wide range from high to low is reflective of the uncertainty.”

The only way to know for sure what’s in a formation is to drill it, and that’s just what a consortium led by Chevron did over the winters of 1985 and 1986, on a sliver of land within the refuge owned by the Kaktovik Inupiat Corporation. The company drilled more than 15,000 feet into one of the most promising formations in the refuge—a large geologic “trap” that, if full of oil, would rival those beneath Saudi Arabia. That well, known as KIC-1, was a “tight hole,” oil-speak for super secret. Ever since, Chevron and the others have closely guarded the results of that well.

But KIC-1 was ultimately a disappointment, say anonymous sources familiar with the well data. The most exciting discovery, the sources said, was found just below the permafrost when they hit a layer they thought was oil but turned out to be hydrate—likely a form of frozen methane ubiquitous in the Arctic. Hydrate has been touted as one of the fuels of the future, but the technology doesn’t exist to tap it. KIC-1,



# [ Kaktovik ]

**Inupiat in Kaktovik harvest one of three bowhead whales they're allowed to kill each year. The hunt is an important part of the people's nutritional and cultural sustenance. But increasing noise pollution from off-shore exploration has diverted whales farther from shore, threatening the hunt.**









The Inupiat of the North Slope stand to become the newest oil barons of the 21st century. But in the process they may lose what makes them Inupiat. Many are none too happy about it.

perhaps the most famous Alaska well since the discovery of oil at Prudhoe, is just another dry hole in the tundra.

One test well, of course, doesn't characterize an entire field—11 dry holes were drilled before they found Prudhoe—but it might explain why oil companies wanted to keep the bad news out of the highly charged political debate. When asked for comment, a Chevron spokesman would only say, "We don't make announcements about what we've found. This is a highly competitive business, and we've chosen to keep the information on that well proprietary."

Drilling proponents, like Alaska Senator Ted Stevens and Governor Frank Murkowski, have long painted the coastal plain as a bleak, frozen wasteland good for little but reducing—however slightly—our dependence on foreign oil.

It's an argument that makes noted wildlife biologist George Schaller, who helped conduct one of the early wildlife surveys in the refuge, shake his head. "It is the ultimate in patriotism to leave future generations what the past reveres," he said. "Drilling in ANWR is just ecological vandalism. You have the landscape of 10,000 years compared with Prudhoe Bay, which has the landscape of New Jersey. What kind of society do we have that would destroy that for future generations for a few more gallons of gas?"

Some industry observers speculate that the oil companies aren't as interested in drilling ANWR as they are in placing pipelines and other infrastructure there to tap the massive fields thought to lie beneath the Beaufort Sea. So far, the prohibitive cost and high risks of developing such fields amid the Arctic ice have kept the oil companies close to shore. But with oil prices climbing and Arctic ice melting, it may soon be profitable to put those fields in play.

Offshore drilling has long been the Inupiat's greatest fear. Even oil company officials admit

that there is no known technology for cleaning up an oil spill in the broken ice conditions that occur in spring and fall—coincidentally when some 10,000 bowhead whales are migrating just offshore. The annual spring and fall bowhead hunts and communal sharing of the whale meat have become the cultural backbone of the Inupiat in the face of the onslaught of westernization. And a spill in an area where the base of the food chain—phytoplankton and marine algae—depends on sunlight filtering through the ice could devastate the Arctic ecosystem for decades.

**B**ush pilot Pat Valkenburg, a retired biologist for the Alaska Department of Fish and Game, banked his little beige Super Cub low and slow over a rough square of tundra a few hundred feet below. "There it is," he said, pointing to a steel pipe poking up from the tundra. "The only test well ever drilled in ANWR. Doesn't look like much does it?" I had to agree. We'd spent the past three hours flying over some of the most spectacular scenery on Earth: The Beaufort Sea, looking like an endless white sheet cake, trimmed in cobalt blue; the buff brown tundra of coastal plain, dotted with caribou; the rolling foothills rising into the mighty Brooks Range, sparkling in the sky like the Emerald City of Oz. This, though mind-blowingly beautiful, was what I expected.

But it was that pesky little pipe that seemed to symbolize the ultimate choice of a nation: Whether to leave one corner of the wildest state the way it has been for millennia, or to leave no patch of tundra unturned to meet our insatiable desire for oil. □

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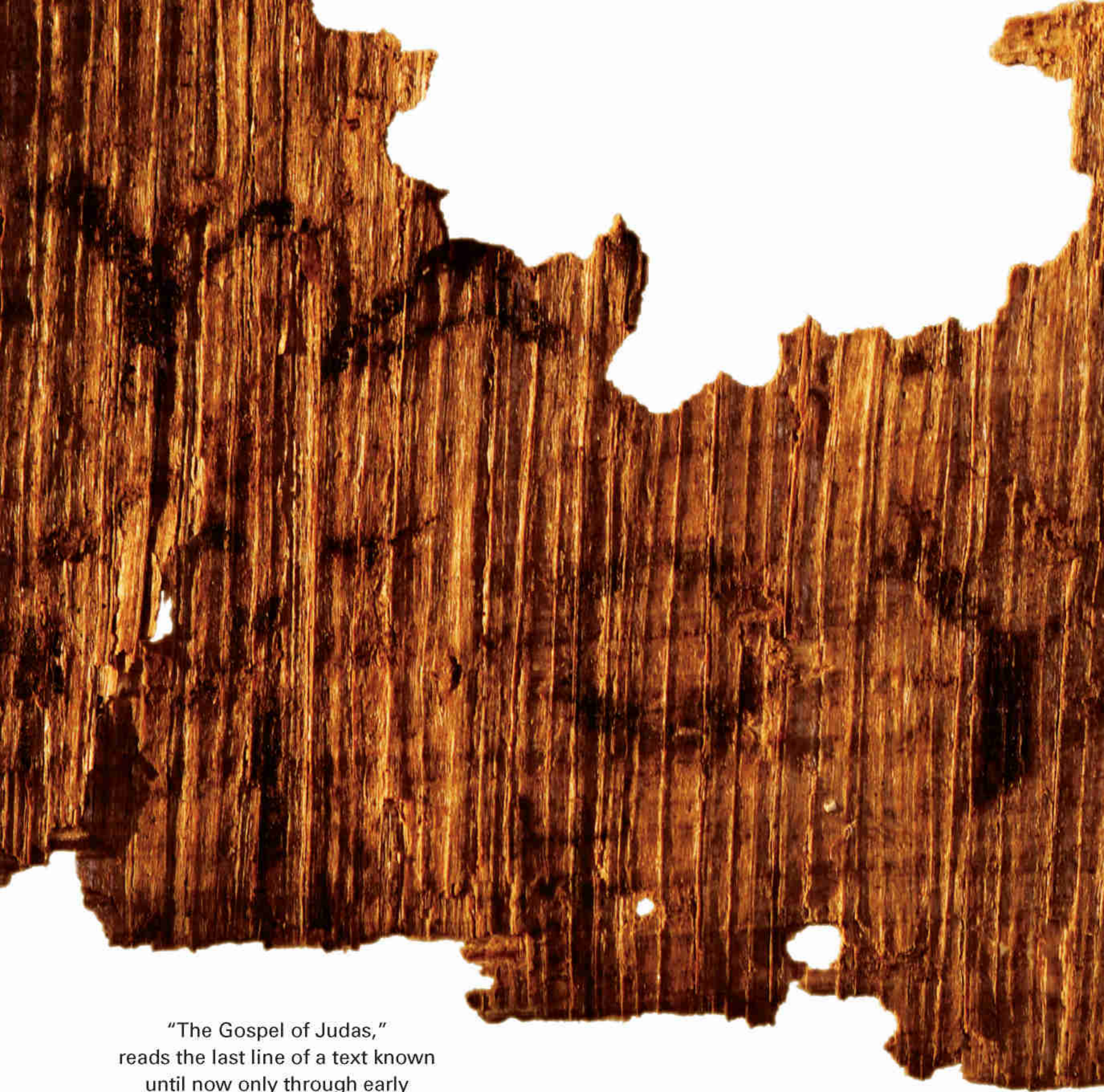
➤ **Wild North** Learn about the challenges the North Slope faces in a multimedia show narrated by photographer Joel Sartore. Then join the oil vs. wilderness debate on our forum at [ngm.com/0605](http://ngm.com/0605).





**Dora Spencer, Miss Top of the World 2004, waves to a Fourth of July crowd in Barrow. In this and other native communities, oil income helps fund health care, electricity, and other modern conveniences—reason to smile. But as industrialization spreads, it could mar the land that sustains native plants, animals, and an ancestral way of life.**





"The Gospel of Judas," reads the last line of a text known until now only through early church leaders, who denounced it as heresy. Copied in the third or fourth century from a second-century original, it sheds light on the Gnostics, whose unorthodox beliefs spread widely in the early years of Christianity—then vanished.

*An ancient text lost for 1,700 years says Christ's*





the  
Judas  
Gospel

*betrayed was his truest disciple.*









**H**ands trembling slightly from Parkinson's disease, Professor Rodolphe Kasser picked up the ancient text and began reading in a strong, clear voice: "*pe-di-ah-kawn-aus ente plah-nay.*" These strange words were Coptic, the language spoken in Egypt at the dawn of Christianity. They had gone unheard ever since the early church declared the document off-limits for Christians.

This copy somehow survived. Hidden over eons in the Egyptian desert, it was finally uncovered late in the 20th century. Then it vanished into the netherworld of antiquities traders, one of whom abandoned it for 16 years in a bank vault in Hicksville, New York. By the time it reached Kasser, the papyrus—a form of paper made of dried water plants—was decaying into fragments, its message on the verge of being lost forever.

The 78-year-old scholar, one of the world's leading Coptic experts, finished reading and carefully placed the page back on the table. "It is a beautiful language, is it not? Egyptian written in Greek characters." He smiled. "This is a passage where Jesus is explaining to the disciples that they are on the wrong track." The text has entranced him, and no wonder. The opening line of the first page reads, "The secret account of the revelation that Jesus spoke in conversation with Judas Iscariot. . . ."

After nearly 2,000 years, the most hated man in history is back.

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When the bound papyrus manuscript containing the Gospel of Judas reached conservators in 2001, it was falling to pieces. But within its fragmentary pages lay a radical reinterpretation of Judas's betrayal of Jesus (above).



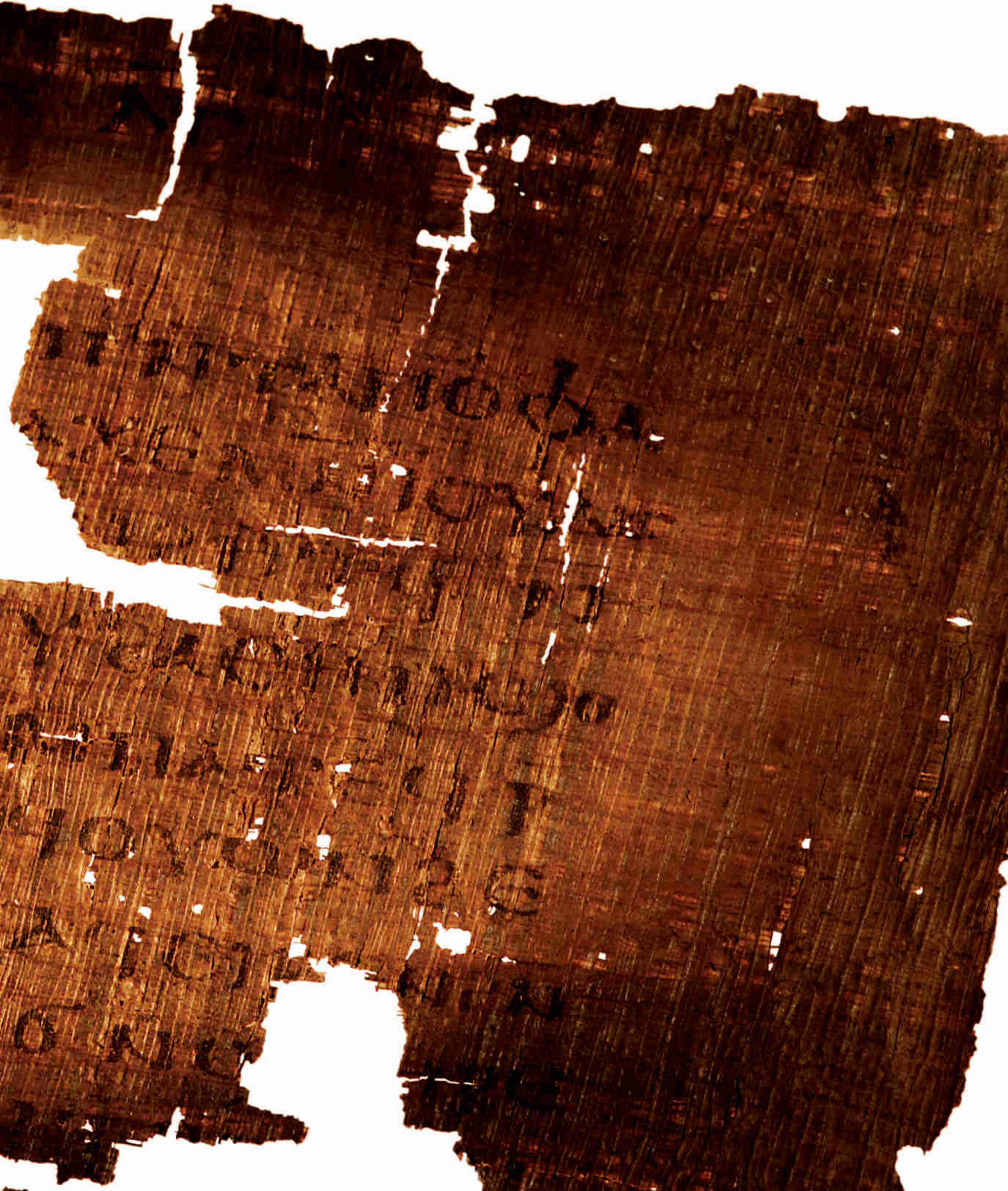
“The secret account of the revelation





that Jesus spoke in conversation  
with Judas Iscariot....”

—*Gospel of Judas, introduction (shown below)*





“You will exceed all





of them. For you will sacrifice  
the man that clothes me.”

—Christ speaks to Judas (shown below)







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The New Testament says a treacherous Judas sold out Jesus in the Garden of Gethsemane (top). But the Judas gospel says Jesus asked Judas to betray him, thereby freeing his soul from his body. Sentenced to die, Jesus bore a cross to his Crucifixion, reenacted (above) at Jerusalem's Church of the Holy Sepulchre.



Everyone remembers the story of Jesus Christ's close friend, one of the 12 Apostles, who sold him out for 30 pieces of silver, identifying him with a kiss. Later, crazed with guilt, Judas hanged himself. He is the ultimate symbol of treachery. Stockyards call the goat that leads other animals to slaughter the Judas goat. In Germany, officials can forbid new parents from choosing the name Judas. Guides at the historic Coptic Hanging Church in Old Cairo point out one black column in the church's white colonnades—Judas, of course. Christianity would not be the same without its traitor.

There is a sinister backdrop to traditional depictions of Judas. As Christianity distanced itself from its origins as a Jewish sect, Christian thinkers found it increasingly convenient to blame the Jews as a people for the arrest and execution of Christ, and to cast Judas as the archetypal Jew. The four Gospels, for example, treat Roman governor Pontius Pilate gently while condemning Judas and the Jewish high priests.

The "secret account" gives us a very different Judas. In this version, he is a hero. Unlike the other disciples, he truly understands Christ's message. In handing Jesus over to the authorities, he is doing his leader's bidding, knowing full well the fate he will bring on himself. Jesus warns him: "You will be cursed."

This message is startling enough to raise suspicions of fraud, common with alleged biblical artifacts. For example, an empty limestone box said to have held the bones of James, brother of Jesus, attracted massive crowds when it was displayed in 2002—but soon turned out to be an ingenious fake.

A Gospel of Judas is clearly more enticing than an empty box, but so far every test confirms its antiquity. The National Geographic Society, which is helping support the restoration and translation of the manuscript, commissioned a top carbon-dating laboratory at the University of Arizona to analyze the papyrus book, or codex, containing the gospel. Tests on five separate samples from the papyrus and the leather binding date the codex to sometime between A.D. 220 and 340. The ink appears to be an ancient recipe—a mix of iron gall and soot inks. And Coptic scholars say telltale turns of phrase in the gospel indicate that it was translated from Greek, the language in which most Christian texts were

originally written in the first and second centuries. "We all feel comfortable putting this copy in the fourth century," one expert says, "and Kasser is sure enough to devote the end of his life to it."

A further confirmation comes from the distant past. Around A.D. 180, Irenaeus, Bishop of Lyon in what was then Roman Gaul, wrote a massive treatise called *Against Heresies*. The book was a fierce denunciation of all those whose views about Jesus and his message differed from those of the mainstream church. Among those he attacked was a group who revered Judas, "the traitor," and had produced a "fictitious history," which "they style the Gospel of Judas."

Decades before the fragile manuscript in Kasser's hands was written, the angry bishop apparently knew of the original Greek text.

Irenaeus had plenty of heresies to contend with. In the early centuries of Christianity, what we call the church, operating through a top-down hierarchy of priests and bishops, was only one of many groups inspired by Jesus. Biblical scholar Marvin Meyer of Chapman University, who worked with Kasser to translate the gospel, sums up the situation as "Christianity trying to find its style."

For example, a group called the Ebionites maintained that Christians should obey all Jewish religious laws, while another, the Marcionites, rejected any connection between the God of the New Testament and the Jewish God. Some said that Jesus had been wholly divine, contradicting those who insisted he was completely human. Yet another sect, the Carpocratians, allegedly indulged in ritualized spouse swapping. Many of these groups were Gnostics, followers of the same strain of early Christianity reflected in the Judas gospel.

"*Gnosis* means 'knowledge' in Greek," Meyer explains. The Gnostics "believed that there is an ultimate source of goodness, which they thought of as the divine mind, outside the physical universe. Humans carry a spark of that divine power, but they are cut off by the material world all around them"—a flawed world, as the Gnostics saw it, the work of an inferior creator rather than the ultimate God.

While Christians like Irenaeus stressed that only Jesus, the son of God, was simultaneously human and divine, the Gnostics proposed that ordinary people could be connected to God.



# Gospels Lost and Found

JESUS



ca 30  
Crucifixion  
of Jesus of  
Nazareth

100-130  
Rise of Christian  
Gnosticism

JUDAS



ca 180  
Irenaeus, Bishop  
of Lyon, condemns  
Gnostic teachings  
and calls **Gospel  
of Judas** "fictitious  
history"

275-300  
Familiar Christian  
views become  
dominant among  
believers

EARLY CHRISTIAN HISTORY

A.D. 1

100

200

300

TEXTS

49-62  
Paul writes first  
letters—earliest  
New Testament  
(NT) texts

65-95  
Gospels of Mark,  
Matthew, Luke,  
and John (NT)

110-150  
Gospels of  
Thomas and  
Peter (not in NT);  
II Peter, latest  
book of NT;  
Gospel of Mary  
(Gnostic?)

ca 150  
**Gospel of Judas**  
written, Gospel of  
Truth, Secret Book of  
John (all Gnostic)

ca 150-200  
Mark, Matthew,  
Luke, and John first  
recognized as the  
authoritative Gospels

ca 200-230  
Second Discourse  
of Great Seth  
(Gnostic)

Salvation lay in awakening that divine spark within the human spirit and reconnecting with the divine mind. Doing so required the guidance of a teacher, and that, according to the Gnostics, was Christ's role. Those who grasped his message could become as divine as Christ himself.

Hence Irenaeus's hostility. "These people were mystics," says Meyer. "Mystics have always drawn the ire of institutionalized religion. Mystics, after all, hear the voice of God from within and don't need a priest to intercede for them."

Irenaeus began his book after he returned from a trip and found his flock in Lyon being subverted by a Gnostic preacher named Marcus, who was encouraging his initiates to demonstrate direct contact with the divine by prophesying. Hardly less outrageous was Marcus's evident success with women in the flock. The preacher's "deluded victim," wrote Irenaeus indignantly, "impudently utters some nonsense" and "henceforth considers herself to be a prophet!"

Until recent decades, such doctrines were glimpsed mainly through the denunciations of antagonists like Irenaeus, but in 1945 Egyptian peasants found a set of long-lost Gnostic texts buried in an earthenware jar near the town of Nag Hammadi. Among them were over a dozen entirely new versions of Christ's teachings, including Gospels of Thomas and Philip and a Gospel of Truth. Now we have the Gospel of Judas.

In ancient times, some of these alternative versions may have circulated more widely than the familiar four Gospels. "Most of the manuscripts, or at least fragments, from the second



century that we have found are copies of other Christian books," says Bart Ehrman, professor of religious studies at the University of North Carolina. A long-buried side of early Christianity is re-emerging.

The notion of "gospels" that contradict the canonical four in the New Testament is deeply unsettling to some, as I was reminded at lunch with Meyer at a Washington, D.C., restaurant. Brimming with enthusiasm, the ebullient academic polished off a plate of chicken salad while discoursing nonstop on the beliefs in the Judas gospel. "This is really exciting," he exclaimed. "This explains why Judas is singled out by Jesus as the best of the disciples. The others didn't get it."

The lunchtime crowd had emptied out, and we were alone in the restaurant, deep in the second century A.D., when the maître d' hesitantly



367 Athanasius, Bishop of Alexandria, first to list 27 books of New Testament	375 Epiphanius, Bishop of Salamis, condemns <b>Gospel of Judas</b>	ca 380 Christianity becomes official religion of Roman Empire	1844-1859 Codex Sinaiticus, containing one of the earliest New Testaments, found in Sinai	1945 Nag Hammadi library (52 texts, many Gnostic), Egypt	1990s Gospel of the Savior translated from fragments found in Egypt
400		1800 MODERN DISCOVERIES		2000	
300s Estimated date of surviving copy of <b>Gospel of Judas</b>			1886 Gospel of Peter, Egypt 1896 Gospel of Mary, Egypt	1947 Dead Sea Scrolls, Israel	1970s Bound manuscript containing <b>Gospel of Judas</b> , Egypt 2001-2006 <b>Gospel of Judas</b> restored and translated into English



PETER

## Forgotten Christianities

After Jesus' death, early Christians shared accounts of his life and teachings. Dozens were written down, but church fathers chose only four for the New Testament. During the past century, many rejected gospels have been rediscovered. A few, such as the Gospel of Peter, parallel the chosen four. Others, such as the Gospel of Judas, are starkly different, emphasizing *gnosis*—direct knowledge of God through awareness of the divine spark within. Some examples:

**Gospel of Thomas, ca 110**  
Includes unique sayings of Jesus: "If you bring forth what is within you, what you have will save you.... What you do not have within you will kill you."

**Gospel of Mary, early 100s**  
Reveals secrets Jesus gave to Mary Magdalene alone and not his male disciples.

**Gospel of Truth, ca 150**  
In this account Jesus' teachings liberate the soul from a flawed physical world: "You are the perfect day, and in you dwells the light that does not fail."

**Secret Book of John, ca 150**  
Denounces the Old Testament God for trying to hide the truth from humanity.

Claims that Adam and Eve received the divine spirit from the true God.

**Second Discourse of Great Seth, 200s**  
Says that the true Christ was never crucified.

**Gnostic versions** The Passion, the tale of Abel and Cain, and more at [ngm.com/gospel](http://ngm.com/gospel).



Part of the Codex Sinaiticus, a Greek Bible from around A.D. 350 that contains the oldest surviving full New Testament.







handed Meyer a note. It read simply, “God spoke a book.” The cryptic message had been called in anonymously, with instructions that it be delivered immediately to the diner who had ordered chicken salad. Someone seated nearby had apparently thought Meyer was casting doubt on the Bible as the word of God.

**I**n fact it is unclear whether the authors of any of the gospels—even the familiar four—actually witnessed the events they described. Evangelical biblical scholar Craig Evans of Acadia Divinity College says the canonical Gospels ultimately eclipsed the others because their version of Christ’s teachings and passion had the ring of truth. “Those early Christian groups were generally poor; they couldn’t afford to have more than a few books copied, so the members would say, ‘I want the Apostle John’s gospel, and so on,’” he argues. “The canonical Gospels are the ones that they themselves considered the most authentic.” Or perhaps the alternatives were simply outmaneuvered in the battle for the Christian mind.

The Judas gospel vividly reflects the struggle waged long ago between the Gnostics and the hierarchical church. In the very first scene Jesus laughs at the disciples for praying to “your god,” meaning the disastrous god who created the world. He compares the disciples to a priest in the temple (almost certainly a reference to the mainstream church), whom he calls “a minister of error” planting “trees without fruit, in my name, in a shameful manner.” He challenges the disciples to look at him and understand what he really is, but they turn away.

The key passage comes when Jesus tells Judas: “You will sacrifice the man that clothes me.” In plain English, or Coptic, Judas is going to kill Jesus—and thus do him a favor. “That really isn’t Jesus at all,” says Meyer. “He will at last get rid of his material, physical flesh, thereby liberating the real Christ, the divine being inside.”

That Judas is entrusted with this task is a sign of his special status. “Lift up your eyes and look at the cloud and the light within it and the stars surrounding it,” Jesus tells him encouragingly.

“The star that leads the way is your star.” Ultimately, Judas has a revelation in which he enters a “luminous cloud.” People on the ground hear a voice from the cloud, though what it says may be forever unknown due to a tear in the papyrus.

The gospel ends abruptly with a brief note reporting that Judas “received some money” and handed Jesus over to the arresting party.

To Craig Evans, this tale is a meaningless fiction, written long ago in support of a dead-end belief system. “There is nothing in the Gospel of Judas,” he says, “that tells us anything we could consider historically reliable.”

But other scholars believe it is an important new window into the minds of early Christians. “This changes the history of early Christianity,” says Elaine Pagels, professor of religion at Princeton University. “We don’t look to the gospels for historical information, but for the fundamentals of the Christian faith.”

“This is big,” agrees Bart Ehrman. “A lot of people are going to be upset.”

**F**ather Ruwais Antony is one. For the past 27 years, the venerable white-bearded monk has lived at St. Anthony’s Monastery, an outpost in Egypt’s Eastern Desert. On a visit there I asked the kindly monk what he thought of the notion that Judas was merely acting at Jesus’ request in handing him over, and that Judas was therefore a good man. Ruwais was so shocked at the idea that he staggered against the door he was in the act of closing. Then he shook his head in disgusted wonderment, muttering, “Not recommended.”

His fervor echoed the outrage of Bishop Irenaeus—a reminder that here, in the shadow of the stark Red Sea Mountains, the early Christian world is close at hand. Earlier, Father Ruwais took me into the Church of the Apostles. Beneath our feet, recently unearthed, were the long-buried cells, complete with kitchen and bakery, built by St. Anthony himself when he founded his community early in the fourth century.

Within a few years of that event, famous in church history as the beginning of desert

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At St. Anthony’s Monastery in Egypt, Father Maximous El Antony examines a monk’s cell dating from the fourth century. During that period, monks elsewhere in Egypt may have translated the Gospel of Judas from the original Greek into Coptic, creating what is now the sole known copy.



monasticism, an anonymous scribe had picked up a reed pen and a fresh sheet of papyrus and begun copying out "The secret account. . ." The writer cannot have been far away; the area where the codex reportedly was found is only 40 miles due west. He may even have been a monk, for monks are known to have revered Gnostic texts and kept them in their libraries.

By the end of the fourth century, though, it was unwise to possess such books. In 313 the Roman Emperor Constantine had legalized Christianity. But his tolerance extended only to the organized church, which he showered with riches and privileges, not to mention tax breaks. Heretics, Christians who disagreed with the official doctrines, got no support, were hit with penalties, and were eventually ordered to stop meeting.

Irenaeus had already nominated the familiar four Gospels as the only ones that Christians should read. His list ultimately became church policy. In 367 Athanasius, the powerful Bishop of Alexandria and a keen admirer of Irenaeus, issued an order to every Christian in Egypt listing 27 texts, including today's Gospels, as the only New Testament books that could be regarded as sacred. That list endures to this day.

**W**e cannot know how many books were lost as the Bible took shape, but we do know that some were hidden away. The Nag Hammadi trove was buried in a heavy, waist-high jar, perhaps by monks from the nearby monasteries of St. Pachomius. It would have taken only one man to hide the Judas gospel, which was bound together with three other Gnostic texts.

The documents survived unmolested through centuries of war and upheaval. They remained unread until early May 1983, when Stephen Emmel, a graduate student working in Rome, got a call from a fellow scholar, who wanted him to travel to Switzerland and check on some Coptic documents on offer from a mysterious source. In Geneva, Emmel and two colleagues were directed to a hotel room where they were met by two men—an Egyptian who spoke no English and a Greek who translated.

"We were given about half an hour to look into what were effectively three shoe boxes. Inside were papyri wrapped in newspaper," says Emmel. "We weren't allowed to take photographs or make any notes." The papyrus was already

beginning to crumble, so he did not dare touch it by hand. Kneeling beside the bed, he gingerly lifted some of the leaves with tweezers and spotted the name Judas. He mistakenly assumed the name referred to Judas Thomas, another disciple, but he did understand that this was a totally unknown work of great significance.

One of Emmel's colleagues disappeared into the bathroom to negotiate a deal. Emmel was authorized to offer no more than \$50,000; the sellers demanded three million dollars and not a penny less. "No way was anyone going to pay that money," says Emmel, now a professor at the University of Münster in Germany, who sadly recalls the papyrus as "beautiful" and laments its deterioration since the meeting. While the two sides lunched, he slipped away and frantically noted down everything he could remember. That was the last any scholar saw of the documents for the next 17 years.

According to the present owners of the Judas gospel, the Egyptian in that Geneva hotel room was a Cairo antiquities dealer named Hanna. He had bought the manuscript from a village trader who made his living scouting such material. Exactly where or how the trader had come across the collection is unclear. He is dead now, and his relatives in the Maghagha district, a hundred miles south of Cairo, become strangely reticent when challenged to reveal the site of the find.

Soon after Hanna acquired the manuscript and before he could take it overseas, his entire stock disappeared in a robbery. In Hanna's telling, the stolen goods were spirited out of the country and ended up in the hands of another dealer. Later Hanna succeeded in retrieving part of the hoard, including the gospel.

Once upon a time, few would question how a priceless antiquity left its host country. Any visitor could simply pick up artifacts and send them abroad. That is how great museums like the British Museum and the Louvre acquired many of their treasures. Today, antiquities-rich nations take a more proprietary attitude, banning private ownership and strictly controlling the export of their heritage. Respectable buyers such as museums try to ensure a legitimate provenance, or origin, for an artifact by establishing that it has not been stolen or illegally exported.

In early 1980, when the theft took place, Egypt had already made it illegal to possess unregistered antiquities or export them without a



government license. It is not clear precisely how this law applies to the codex. But questions about its provenance have shadowed it ever since.

Hanna, however, was determined to get top dollar for it. The academics in Geneva confirmed through their excitement that it was indeed valuable, so he headed for New York to find a buyer with real money. The foray came to nothing, whereupon Hanna apparently lost heart and retired back to Cairo. Before he left New York, he rented a safe deposit box in a Citibank branch in Hicksville, Long Island, where he parked the codex and some other ancient papyri. There they remained, untouched and moldering, while Hanna intermittently tried to interest other buyers. His price, reportedly, was always too high.

Finally, in April 2000, he made a sale. The buyer was Frieda Nussberger-Tchacos, an Egyptian-born Greek who had made her way to the top

of the cutthroat antiquities business after studying Egyptology in Paris. She will not divulge what she paid, conceding only that a rumored figure of \$300,000 is “wrong, but in the neighborhood.” It occurred to her that the Beinecke Rare Book and Manuscript Library at Yale University might be a possible buyer, so she deposited her wares with one of the library’s manuscript experts, Professor Robert Babcock.

A few days later, as she was heading out of Manhattan to catch a flight to her home in Zürich, the professor phoned. His news was explosive, but it was his excitement, audible even on a cell phone in the din of Manhattan rush-hour traffic, that Frieda Tchacos remembers best. “He was saying, ‘This is unbelievable material; I think it is the Gospel of Judas Iscariot,’ but I really only heard the emotion vibrating in his voice.” Only later, in the long hours over the dark Atlantic,

## Rescuing a Tattered Text

When Zürich antiquities dealer Frieda Nussberger-Tchacos bought the Gospel of Judas for around \$300,000 in 2000, it had been for sale for nearly 20 years and carried from Egypt to Europe to the United States. Rodolphe Kasser, a Swiss expert in such Coptic texts, says he had never seen one in worse shape. “The manuscript was so brittle that it would crumble at the slightest touch.” Thwarted in two resale attempts and alarmed by its deterioration, Tchacos turned it over to the Maecenas Foundation for Ancient Art, which restored and translated the manuscript and plans to give it to Cairo’s Coptic Museum. The National Geographic Society and the Waitt Institute for Historical Discovery are funding the work, and the Society has received the right to publish the complete gospel and cover it in print and on television. But first, conservator Florence Darbre, assisted

by Coptic scholar Gregor Wurst, had to resurrect the tattered text.

Someone had rearranged the pages, and the top of the papyrus (with the page numbers) had broken away. A greater challenge: Almost a thousand fragments lay scattered like crumbs. Darbre picked up the fragile pieces with tweezers and laid them between sheets of glass. With the help of a computer, she and Wurst were able to reassemble more than 80 percent of the text in five painstaking years. Kasser and other scholars translated the 26-page document, a detailed account of long-hidden Gnostic beliefs. Scholars of early Christianity say it is the most dramatic textual discovery in decades. Says Kasser, “This script comes back to light by a miracle.”

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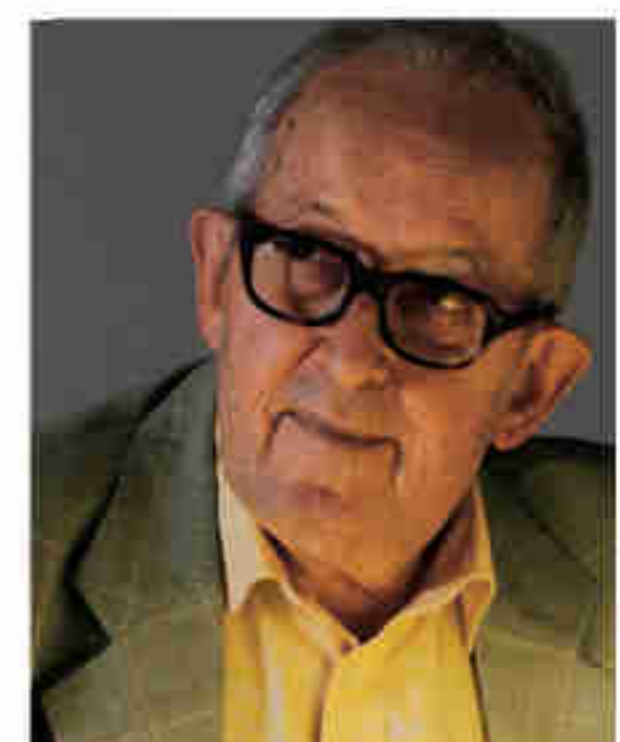
**Latest find** A new piece of the gospel has emerged. See it and learn what it says at [ngm.com/gospel](http://ngm.com/gospel).



Frieda Nussberger-Tchacos



Florence Darbre and Gregor Wurst



Rodolphe Kasser





Perched on Mount Sinai, pilgrims worship where the Bible says God spoke to Moses.

The Christianity that ultimately reached the ends of the Earth was orthodox, not Gnostic. The Judas gospel was hidden away, burying not only its upside-down view of Jesus' betrayer, but also a profoundly different vision of salvation.

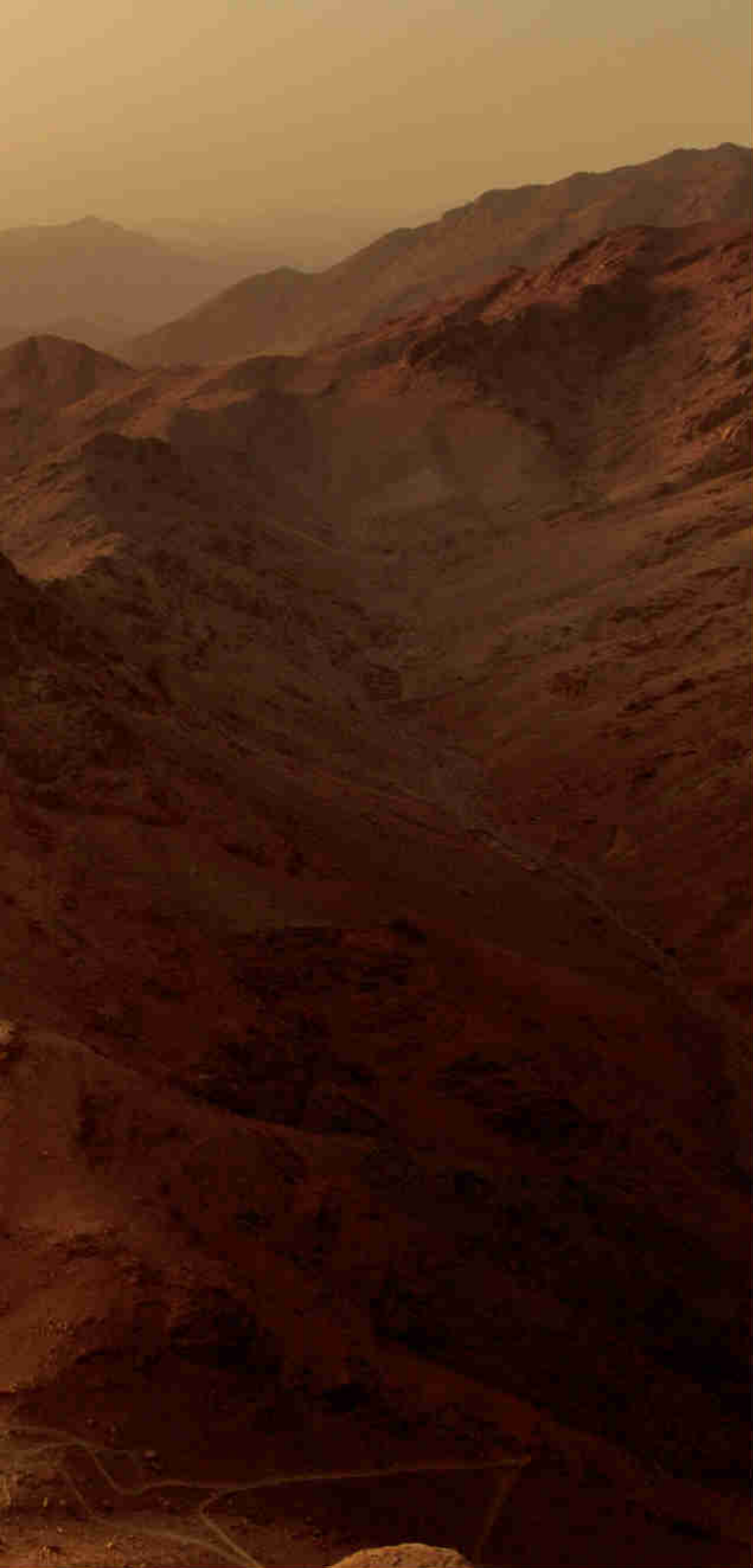
did Tchacos begin to appreciate that she actually owned the fabled Gospel of Judas.

**G**reeks talk about *moira*—fate—and in the months that followed, Tchacos began to feel that her *moira* had become entangled in a terrible way with Judas, “like a curse.” The Beinecke held on to the document for five months but then

refused to bite, despite the vibrating Babcock, largely because of doubts about its provenance. So Tchacos turned from the Ivy League to Akron, Ohio, and an opera singer turned dealer in old manuscripts named Bruce Ferrini.

Her rejection by Yale had been disheartening, and the trip to Akron was a nightmare. “My flight from Kennedy was cancelled, so I had to fly from LaGuardia on a little plane. I had the material





carefully packed in black boxes, but they wouldn't let me carry them into the cabin." Judas flew to Ohio in the hold. In return for Judas and other manuscripts, Ferrini gave Tchacos a sales contract with a Ferrini company called Nemo and two postdated checks for 1.25 million dollars each.

Ferrini did not return numerous phone calls seeking his version of the story. But people who saw the Judas manuscript while it was in his possession say that he shuffled the pages. "He wanted to make it look more complete," suggests Coptic expert Gregor Wurst, who is helping to restore it. More fragments were coming off.

Tchacos had begun having qualms about the deal within days of returning home. Her doubts

increased when a friend named Mario Roberty pointed out that *nemo* is Latin for "no one."

Roberty, a quick-witted and engaging Swiss lawyer, knows the world of antiquities dealers and runs a foundation dedicated to ancient art. He was, he says, "fascinated" by Tchacos's story and happily agreed to help her reclaim Judas.

Ferrini's huge checks were due at the beginning of 2001. To help keep pressure on the Akron dealer, Roberty enlisted the antiquities trade's own weapon of mass destruction, a former dealer named Michel van Rijn. The London-based van Rijn runs a wide-ranging website that is totally uninhibited in flaying his many enemies in the antiquities world.

Briefed by Roberty, van Rijn broke the news of the gospel, adding that it was "in the claws of the 'multi-talented' manuscript dealer, Bruce P. Ferrini," who was in "deep financial troubles." In stark terms, he warned potential buyers: "You buy? You touch? You will be prosecuted!"

As Roberty cheerfully recounts, deploying van Rijn "worked, quite decisively." (More recently, van Rijn changed tack and began fiercely attacking Roberty and Tchacos on his site. "I think he's used up all his ammunition," says Roberty serenely.) In February 2001, Tchacos reclaimed the Judas codex and brought it to Switzerland, where, five months later, she met Kasser.

At that moment, she says, Judas turned from curse to blessing. As Kasser began painstakingly teasing the meaning of the codex from the fragments, Roberty embarked on an imaginative solution to the provenance problem: selling the translation and media rights while promising to return the original material to Egypt. Roberty's foundation, which now controls the manuscript, has signed an agreement with the National Geographic Society (see page 93).

Relieved of her marketing concerns, Tchacos has herself begun to sound a little mystical. "Everything is predestined," she murmurs. "I was myself predestined by Judas to rehabilitate him."

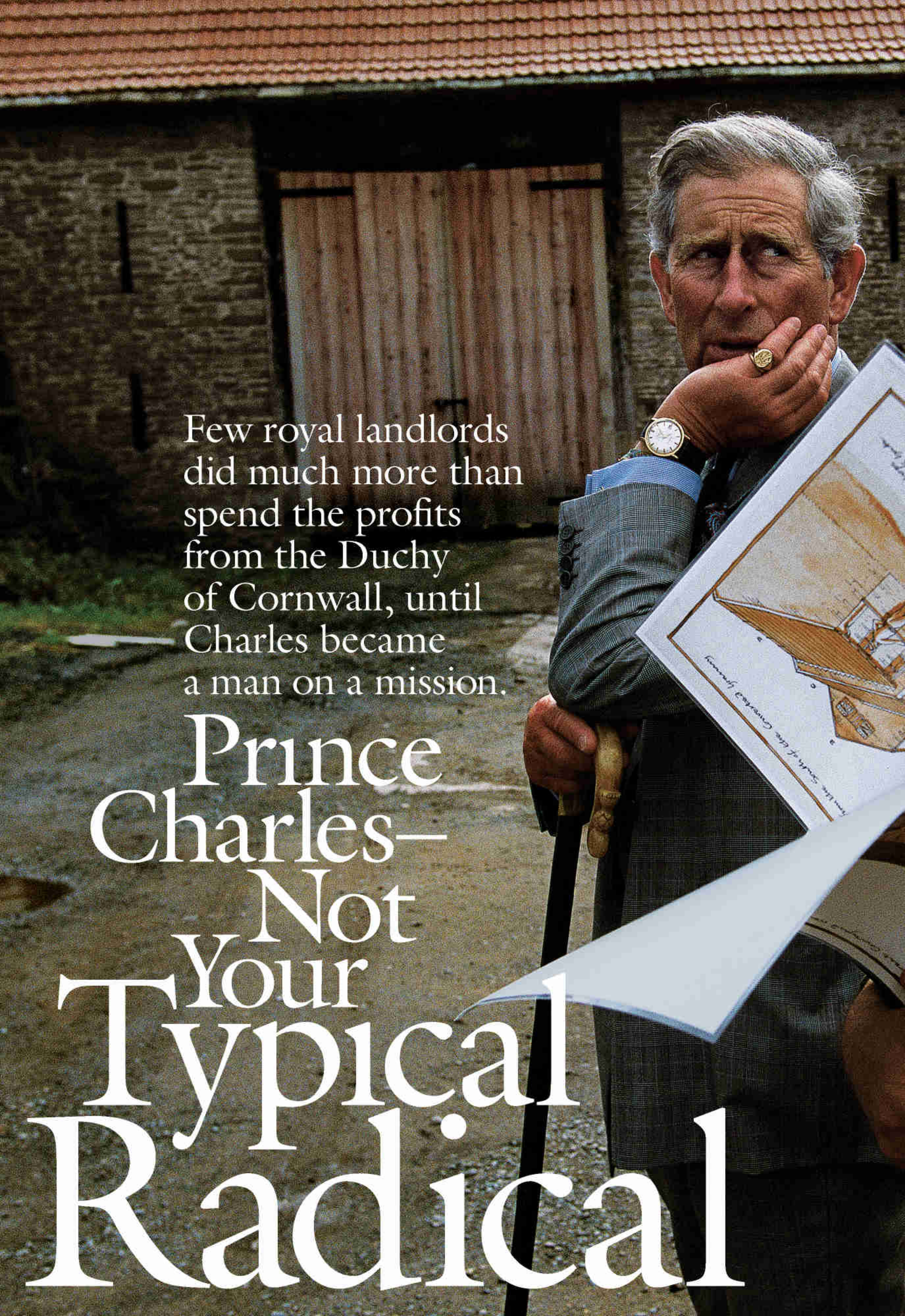
On the edge of Lake Geneva, upstairs in an anonymous building, a specialist carefully manipulates a tiny scrap of papyrus into its proper place, and part of an ancient sentence is restored.

Judas, reborn, is about to face the world. □

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**Judas online** Explore the world of the gospel in Sights & Sounds, zoom in on interactive manuscript pages, and join our forum at [ngm.com/gospel](http://ngm.com/gospel).



A photograph of Prince Charles in a grey suit, standing in front of a stone building with a wooden door. He is holding a cane in his right hand and a set of architectural plans in his left. He has a thoughtful expression, with his left hand resting against his chin. He is wearing a watch and a ring.

Few royal landlords did much more than spend the profits from the Duchy of Cornwall, until Charles became a man on a mission.

Prince  
Charles—  
Not  
Your  
Typical  
Radical





*Architect Craig Hamilton confers with Prince Charles on barn renovations in Herefordshire. As the 24th Duke of Cornwall, Charles directs the multi-million-dollar business of the Duchy of Cornwall. Wielding royal prestige and duchy financial clout, he's showing that an eco-friendly, preservation-minded operation can turn a profit—and protect Britain's rural heritage.*







*Gardeners clip golden yews into a gallery of fanciful shapes at Highgrove House, the prince's private home in Gloucestershire. For 25 years Charles has renovated, replanted, and fine-tuned the house, gardens, and nearby Home Farm. "I want the duchy to be renowned for the highest quality," he says, "whether it's the way we build or the way we organize our farming."*





BY SANDY MITCHELL

PHOTOGRAPHS BY CATHERINE KARNOW

Prince Charles gave no warning that he was about to abandon his usual restraint. He simply began slicing the air with his hands as his voice rose in frustration: "I had witnessed this appalling horror of the 1960s, when everything was thrown away, denigrated, abandoned. I watched as woods were cut down, hedges uprooted, wonderful old buildings knocked down. I minded dreadfully.

"My whole aim was to repair the damage, to heal the wounds, as it were, of the countryside." Calmer now, his voice falling to its usual hoarse whisper, he settled back in the silk armchair, smoothing his flawless blue suit. Meanwhile, the uniformed footman at Clarence House, the prince's London mansion, went about his

business, sliding in and out of the drawing room.

One day Prince Charles, now 57, will be crowned king (his mother is already 80). Judging from the way he has handled his inheritance so far—more than 135,000 acres of mostly rural land known as the Duchy of Cornwall—the country may be in for some surprises. He has used this private little kingdom as a place to test solutions to the problems of modernity, for the prince believes, fervently, that life in both town and country has gone awry.

"All my life," the prince said, "I have tried to break conventional molds because I think they are mistaken. The only way I could do it was through the duchy, to show there was an alternative way of looking at things."

And so just over a decade ago, on 400 acres

## AN ANCIENT ESTATE, FROM SHEEP TO SHORE

*If the first Duke of Cornwall could step from the 14th century into the modern duchy, he'd find familiar scenes. The squirming sheep hoisted by 22-year-old Home Farm intern James Pritchard (below) is a native Welsh breed. Turquoise waves still batter the Cornish coast near Tintagel Castle, where legend says King Arthur was born.*





owned by the Duchy of Cornwall since the 14th century, ground was broken for a new village. Situated on the western edge of Dorchester, a Roman-era market town in the lush county of Dorset, Poundbury is Prince Charles's dream made real, his answer to the "unadulterated ugliness and mediocrity" of typical housing estates and the "heartlessness of so much urban planning."

With more than 650 houses now completed and another 1,600 to be built over the next 15 years, Poundbury's architecture borrows from the quaint cottages found in Dorset and doffs its hat to grander 18th-century houses in Dorchester. All the buildings are faced with time-tested local materials, such as honey-colored hamstone, with the aim of helping the community take root in a familiar atmosphere.

"What I was trying to do," the prince said, "was remind people about the pointlessness of throwing away all the knowledge and experience and wisdom—*wisdom*—of what had gone before."

Clare Jenkins, a former chairperson of the

Poundbury residents' association, lives with her husband, Mike, and their two young sons in an upmarket, four-bedroom, classically styled house looking toward the Iron Age hill fort of Maiden Castle. She and Mike started an IT-support company in a workshop within yards of the house. "I can walk to work," she said. "The kids can walk or cycle across the fields to school. However they have done the urban planning, it appears to have worked. There are no huge main roads. You walk to the local shop rather than drive to the big supermarket. There are no front gardens to hide behind and no big back gardens, so when the kids want to play, you go out to the fields and bump into more people. It makes a very different sense of community."

Unlike the conventional developments the prince so despises, Poundbury follows a design of almost unnerving boldness despite its cozy old-world atmosphere. Dotted with offices and several inconspicuous factories, it is densely packed, enabling many residents to walk to





## MANAGING A 669-YEAR-OLD TRUST FUND

*Edward III (below) created the Duchy of Cornwall in 1337 so that income from its holdings (map, right) could pay the bills of the royal heir. Boosted in part by Charles's focus on sustainable development, duchy profits rose from 12.3 million dollars in 2000 to 23.5 million in 2004.*

work, and its tight lanes and snaking avenues are meant to baffle motorists. "If you design with the pedestrian at the center, not the car," the prince said, "then you tend automatically to produce a more livable community."

Looking at the pretty facades of Poundbury's houses, you would never guess that as many as one in three is earmarked for people who can't afford open-market rents or purchase prices—reflecting Prince Charles's conviction that strong neighborhoods can best be fostered by mimicking the social and economic mix of a traditional village.

He admits that Poundbury is an expensive experiment, launched in the face of opposition from architects, planners, and economists. The high costs followed inevitably from his determination to avoid the mass-produced materials that give a dreary, uniform look. In Poundbury even the curbs are granite rather than the usual concrete blocks.

"It very nearly didn't end up like it is now because there were efforts to water it down," the prince said. "But we have probably shown that for a ten percent extra cost, roughly, you are actually achieving a far higher value in the longer term than the shorter term, which is the way the modern world looks at everything."

Indeed, Poundbury is so successful that it has spawned smaller versions of itself elsewhere in the duchy, and a bigger version is set to rise next to the Cornish town of Newquay. There the prince plans to incorporate, along with his "Poundbury principles" of design, advanced strategies for environmental sustainability, such as rainwater harvesting and geothermal technology. Experience gained at Poundbury should help. "It took a long time to wear down the public utility people to have one common trench for water, electricity,



and gas," he said. "That was more difficult than you would believe possible. It means you don't have to dig up the road every five minutes—and, you know, one common satellite dish means you don't have to have these things stuck all over everything like a rash."

The prince's hope that his vision will shape urban living beyond the duchy seems to be coming true. The British government has embraced the Poundbury principles, and last year curi-

ous city planners and high officials from numerous countries, including the United States, walked Poundbury's streets. "Saudi Arabia is now going to come and have a look as a result of my encouraging," the prince said.

PRINCE CHARLES'S duchy legacy stretches back a long way. On March 17, 1337, after "anxious meditation," King Edward III declared that his eldest son, the Black Prince, must henceforth enjoy an income worthy of an heir to the throne. So the king granted some of his castles, manors, and hamlets—largely in the counties of Devon and Cornwall—to his son, along with a spiffy new title: the Duke of Cornwall.

Most of the dukes left the tenants and lands alone. Not Prince Charles, who oversees the estate's work to an astonishing degree. His 72-strong duchy staff has learned not to build any new cottage, or fell an acre of woodland, without first seeking the royal nod. He sends Bertie Ross, his chief executive (officially, the Secretary and Keeper of the Records), a constant flow of detailed notes, handwritten in ink, with ideas or queries. But the day-to-day work of dealing with duchy projects and tenants is left to the staff, spread between the head office in London and four regional outposts managed by











## A LANDLORD AT HOME WITH HIS TENANTS

*Touring Herefordshire last spring, Charles stopped for tea and a gardening chat with Garth Bradbury and Emma McCleary, who run a custom fence business and a livery stable on their duchy farm. At Highgrove, prizes won by the prince's chickens adorn the henhouse door (below).*

"It's a working farm—it's not meant to be a show-piece," said David Wilson, the manager of Home Farm, hurrying off on his stork-like legs to check two quarantined calves suffering from ringworm. In their barn he had tied a bunch of holly twigs to a beam above their heads, like a get-well bouquet. "It's a folk remedy," Wilson said. "They say it works, We will give anything a try."

At Highgrove, a reed bed is used to filter sewage from the main house, and the sheep, cattle, and pigs include an array of officially designated "rare breeds" forgotten by mainstream farmers. "The modern idea," the prince said, "was that you had to have ever more high-yielding animals. These traditional breeds are coming into their own because, of course, you don't want ever greater production, you want animals that are better quality, and you want animals that are better adapted to their local conditions. All this was being thrown away." The prince sees vindication in recent changes to the European Union's farm subsidies, which now emphasize environmental sustainability rather than output.

What Prince Charles has done, all in all, is turn his back on mainstream farming and land management, with their chemical fertilizers, pesticides, and antibiotics, to prove that a system more in tune with nature can be commercially viable. To rub in his point, he has gone on to create a successful range of goods, from organic jams to garden furniture, under the label Duchy Originals. The profits of around a million pounds a year go to his charities.

"In farming, as in gardening," the prince once wrote, "I happen to believe that if you treat the land with love and respect (in particular,



respect for the idea that it has an almost living soul, bound up in the mysterious, everlasting cycles of nature) then it will repay you in kind." Evidence of that passionate belief is abundant at Home Farm, down to his organically grown carrots. "Those carrots are very special," he said ardently. "Just smell them. Absolutely marvelous."

Two decades ago when he began this crusade, many British farmers felt his experiments were a rebuke to their efficient modern methods. "He was publicly ridiculed.

It was withering," recalled Patrick Holden, director of the Soil Association, the main organic growers body. But since then, the area in Britain farmed organically has increased more than a hundredfold. How much of that can be put down to Prince Charles and Highgrove? "I don't think it can be overestimated," Holden said. "He has emerged as the clear global leader of the sustainable agriculture movement, and rightly so."

The duchy, like any other landlord, could require its new tenants to farm organically. But instead, all duchy farmers are urged to commit to a series of environmental objectives for wildlife and native flora. Beyond that, when choosing new tenants, the duchy favors organic farmers on land it considers suitable.

The tenants seem to like the hands-off approach, and they respect the prince. "He understands about livestock. He understands farming because he's a farmer too," one dairyman said. Of dozens of tenants interviewed, only one refused to go on the record with his unflattering opinion (complaining about the prince's "fixation" with organic farming), fearing that if he were named as someone who spoke out against "Charlie boy,"









*Set in the heather-cloaked hills of Devon's Dartmoor uplands, Headland Warren Farm dates from the 15th century—nearly as old as the duchy itself. Soils are poor here, the climate harsh. Across much of this windswept landscape, prosperity remains elusive. "In a place like Dartmoor," the prince says, "we have to accept that nature imposes limitations."*





## LEADING BY EXAMPLE

*The final weeding of the royal carrot beds is by hand (above), and no chemicals inhibit the bloom of poppies amid the heirloom wheat at Home Farm. “Historically, lords of the manors tried things, and tenants looked over the hedges,” says duchy tenant Graham Vallis. “The prince farms the way he’d like us all to farm, but leaves it up to us whether we do it or not.”*



he might lose his home and farm. It was much more common to hear farmers, sitting in the privacy of their kitchens and warmed by a bottle or two of ale, comparing their lot with that of neighbors whose landlords don't give them free shooting rights, or repair their homes with obsessive care for the historic fabric, or bother giving them Christmas presents.

FAR DOWN ENGLAND'S southwestern leg, Dartmoor is the biggest single lump of duchy land, covering more than 67,500 acres of high, wild moor. On a Sunday in early September, a small group of farmers rode out through the early morning mist on the Chagford drift, one of several autumn roundups of Dartmoor ponies to bring in foals for branding and to gather surplus ponies for sale at local auctions. One of the men, riding a piebald horse, cracked a long leather whip above his head to mobilize the herd, while four others bucked ATVs across

the pale tussock grass to head off breakaways.

When they had gathered about 50 of the half-wild ponies, the men drove them in a volatile mob down a narrow lane to Yardworthy Farm, near the village of Chagford. There, in the cold, gray farmyard, Sue Hutchings, whose 28-year-old son, Philip, had been on the drift, spoke of the pressures facing farmers. “Five years ago we would have brought in 100 ponies—how many were there today?” she asked rhetorically. “We have 25 of our own now, and we used to have 40. We keep them on because it's the tradition for our farmers.”

These short-legged, tubby ponies—a rare breed—are promoted in the tourist industry as emblems of the moor. But in the 1980s the market for the ponies fell, in step with the fortunes of the nation's hill farmers. The breed's survival was further jeopardized by interbreeding with non-native ponies released on the moor. So some Dartmoor farmers, with the duchy's





financial support, began a program to promote pure bloodlines. There's no profit in this for the duchy: It is driven by a sense of responsibility for Dartmoor and by Prince Charles's stubborn belief in the intrinsic value of traditional breeds.

"The prince worked here for a week with my husband's father—milking, building stone walls—when he wanted to learn what it was like for farmers," Sue said, her long brown hair blowing about in wisps. A close royal connection, however, does nothing to change the harsh economics of Yardworthy Farm. "We've just worked out that after expenses we literally make a pound fifty [\$2.60] on a fattened bullock, if we're lucky. We made 20 pence on a sheep this year, if that. We always have a huge overdraft." At such rates of return, the family could sell its entire stock of 80 cattle and 800 sheep and make a profit of only \$500.

For the Hutchings, there is no letup. Farm subsidies help, but Philip works almost every

daylight hour, and Sue puts in a 35-hour week on the night shift at the local hospital, in addition to helping on the farm (full-time during the lambing season). Philip's brother, Ian, a builder, assists when he can, while Sue's husband, Wilf, 57, makes essential money building stone walls for other farmers.

When Sue and Wilf get too old for this grind, Philip will become the third-generation tenant at Yardworthy. Does he worry about the future? "I lose sleep over it," he answered quietly.

If it chose, the duchy could declare a short-term rent "holiday" for its hardest hit tenants, as in 2001, when foot-and-mouth disease devastated many farms. But this wouldn't solve the entrenched problems of agriculture. Instead, it has launched a "hill-farm initiative," aimed at promoting the sale of local produce by creating a new marketing brand. "All those upland areas are real challenges," the prince said. "I think the future lies in emphasizing the assets they have





*Gathering his ponies for auction, Ivan Mortimore hopes his son will take over the family's Dartmoor farm. "I'm beginning to wonder if that will be possible," the lifelong duchy tenant admits. In recent years Britain's livestock industry has been hard hit by low prices and devastating diseases. "But you've got to try to carry on," Mortimore says, "don't you."*







and trying to find a way of making the most of their local identity and characteristics. At one point there was a terrific sort of 'yo-ho' view that you should bring in go-ahead tenants who can show the locals how to farm properly. Somebody was brought down, and he rushed about on this farm on Dartmoor and after five years went completely belly-up because he tried to do things on the moor you simply cannot do. It taught me a lot about the need to respect the natural local conditions. If you try to kick nature in the teeth and push her too far, she will kick you back."

Prince Charles has urged tenants, through seminars and the land stewards, to try more lucrative enterprises than agriculture. Bed-and-breakfasts and holiday cottages have popped up all over the duchy estate, though not on Yardworthy. "We don't have any barns we can convert," Philip Hutchings said.

None of the Dartmoor tenants has given up yet. But if they do, the duchy has said it will not sell

any vacant farms, even though city people would snap them up for millions of pounds.

IN THE 1800S the duchy leased its most isolated territory, the Isles of Scilly, some 30 miles off England's southwestern tip, to a banking heir from the mainland whose ambitious plans earned him the nickname Emperor. The experience left the Scillonians with little fondness for people (royal princes included) dictating to them from beyond their outpost.

"They don't like us at all," boomed Colin Sturmer, the land steward, who is based in Hugh Town, the only substantial settlement on the five main islands. "They've lived here for generations, and a lot of what you see is by their own hand. They've built their own houses, the land is managed by them, and to a large extent they've been viewed by mainlanders as just '2,000 drunks stuck to some rocks out in the Atlantic.'"

Looking around the landscape of white-sand beaches and tiny green fields bordered by hedges

## SCILLY ISLES SQUEEZE

*Conservation regulations protect the beauty of the Isles of Scilly (St. Agnes, below), to the delight of tourists who generate 85 percent of local income. But the controls also limit options—including the duchy's—for solving the islands' housing shortage. Mainland transplant Chris Charlton (right) bunks in a friend's St. Martin's greenhouse while waiting to find a place of his own.*





entwined with wildflowers, you see how wildly wrong that impression is.

“Why would you want to live anywhere else?” asked Chris Charlton, 37, a jet-boat skipper on the islet of St. Martin’s. For the past six years, he has inhabited a corner of a friend’s outdoor greenhouse—bare concrete floor, glass roof, no running water, no curtains to keep out the winter cold or summer heat. “I had a greenhouse thermometer by my bed that topped out at 50 Celsius [120 Fahrenheit], and it blew the top off it,” he said, laughing.

“It’s difficult because I want accommodation on the island, but I have to live somewhere here to qualify, so I’ve got to put up with this.” Charlton estimated that there were ten other “shed dwellers”—typically single men from the mainland, like him—living unofficially on St. Martin’s that summer.

Yes, Colin Sturmer said, the duchy’s problems in the Scilly Isles come down to “housing, housing, and housing.” Because it has had such a dominant

role for so long, and still owns nearly a third of the residential property, many islanders (though not Charlton) automatically blame the shortage and out-of-reach rents on the duchy’s greed. They may not know how constrained the duchy is. Many of the properties are under long leases, and today’s planning laws—designed to protect the charm of the islands—restrict the building of houses. Nor does the government treasury readily allow the duchy to indulge in philanthropic gestures, such as fixing rents below the local market rate.

Sturmer loathes haggling with tenants over rents. He’s much happier working on the duchy’s initiatives: converting a quayside shed into an icehouse so local fishermen can freeze their catch cheaply; helping with the marketing of locally grown narcissi; encouraging farmers to graze their cattle on the headlands, which allows native flowers to flourish.

But even these efforts don’t tamp down the simmering hostility, inflamed recently when the







## BUYING INTO THE ROYAL VISION

*The Parmenters (above) have lived happily in Poundbury for five years. With its narrow streets, local-stone facades, and eclectic roofscapes (right), the prince's model town in Dorset embodies many of his most cherished principles, honoring pedestrian over car, traditional over modern. Breaking the commercial mold wasn't easy, Charles says. "I suppose you could say—it's radical."*

duchy rented two of its 340 island properties as holiday cottages, each earning up to \$3,000 a week, easily ten times the rent a Scillonian would pay. "The prince goes on about affordable housing," a local boatman said. "It's just hypocrisy. Don't quote me, though—most of my business comes from the duchy." The duchy regards the income from the cottages as a necessary extra return on the investment it makes in the islands' infrastructure.

What does Prince Charles make of the housing situation? "Many of the people on the Isles of Scilly," he replied, "have lived there for generations, and it matters to me desperately that they continue to do so. The duchy recognizes the problem of affordability and has provided a number of affordable homes for local people in addition to twenty houses for key workers. But more needs to be done, and that is why we are working to build new affordable homes."

Soon enough, Prince Charles will assume his

mother's duties, and such questions will face the next Duke of Cornwall, Prince William, who is now 23.

"I have been trying to create more of a family feeling about the duchy, so that it becomes a slightly more personal exercise," the prince said. It is no exaggeration that Prince Charles has done more for—and with—the duchy in 40 years than all his forebears in nearly 700. His deepest hope now is that William will carry on his vision, strengthening the relationship he has worked to forge with the tenants.

"I just love the idea of my son continuing with them," the prince said, speaking so softly he was nearly drowned out by the Clarence House clocks chiming the hour. □

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**Private Kingdom** For centuries income from the Duchy of Cornwall has supported the heir apparent. Is there a place for an active monarchy today? Share your thoughts in our forum at [ngm.com/0605](http://ngm.com/0605).









# misery for all seasons

allergies: a modern epidemic

**Soak and seal** A warm bath and wet head towel, then medicated creams beneath a mummy-like body wrap—it's part of a daily routine that helps 11-year-old Olivia Fitzgerald rehydrate her painfully dry skin. Her condition, severe atopic dermatitis, is triggered by her allergies to mold, grass, nuts, cats, and dogs. And though her illness can be a lonely ordeal, Olivia is hardly alone: Allergy rates worldwide have been rising for decades, as scientists search for explanations and cures.












A person wearing a white protective suit and blue gloves is working on a wooden structure. The person is positioned on the left side of the frame, with their hands and arms visible as they work on the wood. The wood is a light brown color and has a rough, textured surface. The background is dark and out of focus.

**Sucking it up** Wearing head-to-toe protection, Andy Izbicky of Ductbusters Inc. vacuums mold, dust mites, and other potential allergens out of the ventilation system at a Florida hotel. Since the 1970s energy crisis, buildings have been constructed to maximize heating and cooling efficiency, which locks allergens in. "They're built tighter," Izbicky says, "and there's not enough fresh air." Izbicky suffers from allergies himself—"to mold, grass, dust mites . . . and work."







By Judith Newman

Photographs by David McLain

**Slim and serious**, he mounts his bike. His long fingers grasp the handlebars firmly, and he checks his balance. Today he has a cold, and the circles under his eyes are darker than usual. When he explains his situation, he speaks with deliberation. “I don’t eat much, unless Mom can check the ingredients. Then I can eat. But not ’til then.”

Why so cautious? Maybe it’s the result of spending so much of his childhood trying to make himself understood to doctors while gasping for air. Knowing that the simplest things can kill you . . . well, it does make a guy careful.

Cameron Liflander has allergies. This makes him no different from more than 50 million other Americans today. But his problem is not merely the watery eyes or scratchy throat we associate with that word. Cameron’s seven-year-old body is waging a fierce war with his environment. And his mother fears that one day the environment could win.

“A pediatrician told me I was being silly,” says Pamela Liflander, who repeatedly asked about her infant’s oozing, blistering rashes, his constant spitting up. “The doctor said no child under three has real allergies, and the rashes and vomiting would go away. But I’d had a child before Cameron. I knew what a healthy baby looked like. This was not a healthy baby.”

Cameron continued to look sickly, but his growth rate was on the charts. He drank breast milk for almost a year, and Pamela introduced other foods gradually. One day she gave him a bite of tuna. Cameron turned red, swelled like a sea sponge, and choked. Benadryl

**Magnified threat** What’s an allergy? It happens when mold (left) or other generally harmless substances rile up the immune system, which senses danger where none exists.

took care if it, but with the next anaphylactic reaction they ended up in the emergency room near their Riverside, Connecticut, home. It would be the first of many visits.

Just how many things could one child be allergic to? Over the next few years, the Liflanders would find out.

Suppose that 54.3 percent of U.S. citizens had cancer. That figure might set off a nationwide panic—a search for something wrong with our diet, our environment, our activity levels . . . something. In fact, that’s the number of Americans who show a positive skin response to one or more allergens (although not everyone who tests positive has an actual allergic disease such as rhinitis, asthma, or eczema).

The manifestations of allergy—sneezing, wheezing, itching, and rashes—are signs of an immune system running amok, attacking foreign invaders that normally mean no harm. Allergens include pollen, dust mites, mold, food, latex, drugs, stinging insects, or any of the other oddball substances to which the body can choose to react, or overreact.

Asthma is a big contributor to keeping allergists in business. This chronic inflammation that causes airways to constrict affects about 20 million Americans, twice as many as 20 years ago. About 4,000 die each year. But all told, allergies rarely kill. They just make the sufferer miserable—sometimes for brief periods, and sometimes for life.

The U.S. is not the only country with high



The hygiene hypothesis has its complexities and contradictions, but the basic idea is this: If the Liflanders had wanted to prevent Cameron's allergies, they should have moved a cow into their living room.



**Good dirt** His mother calls him Dominik, but to scientists in Bavaria, Germany, he is G-00195—one of 1,163 children participating in a five-nation study to see why farm children tend to be less prone to allergies. The study's director, Erika von Mutius, at Children's Hospital at the University of Munich, thinks early exposure to beneficial microbes in dirt and animal waste may help the immune system distinguish later in life between real threats and bogus ones.



allergy rates. In the U.K. more than 20 percent of the population has active allergies. New Zealand, Australia, Ireland, and the U.K. have the highest prevalence of asthma in the world. Allergies, like obesity, are essentially an epidemic of modernity. As countries become more industrialized, the percentage of population afflicted tends to grow higher. There are remote areas of South America or Africa, for example, where allergies are virtually nonexistent.

**At first glance** the problem of allergies seems simple, and for most of us the solution is simple too: a handy drug like Zyrtec or Atrovent to treat the symptoms.

But maybe it's not so simple. We live in a nation where states have enacted legislation permitting asthmatic children to carry their inhalers to school (one in 13 must do so). A federal labeling law mandates manufacturers clearly state in plain English whether major allergens—peanuts, soy, shellfish, eggs, wheat, milk, fish, and tree nuts—are ingredients in any product. And Americans spend billions of dollars annually on antihistamines to treat the symptoms of allergies.

Those of us over 40 don't remember having so much as a conversation about food allergies in school. Today 6 percent of young children have food allergies—and the number of those with potentially fatal peanut allergy doubled between 1997 and 2002. Children like Cameron sit at special tables at lunchtime; there are websites and support groups for parents homeschooling their severely allergic children.

Still, most allergies seem relatively innocuous. And it's true that more people believe they have allergies than actually do. For example, the gas and stomach pain of lactose intolerance? Not an allergy. But the rise in allergies is real. On a global level we need to better understand what's happening.

Here's how an allergy unfolds: One day, a body is exposed to a protein in something that seems perfectly harmless—the wheat flour, say, in a home-baked muffin. But for some unclear reason, the body looks at the protein and sees Trouble. There will be no symptoms at first, but the body is remembering—and planning.

That first exposure causes the immune system to produce an antibody called IgE (immunoglobulin E). Then IgE antibodies

attach to certain cells, called mast cells, in tissue throughout the body. There they stay like wary sentinels waiting for war. With a second exposure, even months later, some of the allergen binds with the IgE on the mast cell. This time the mast cell releases a cascade of irritating chemicals: histamine, prostaglandins, and leukotrienes, which cause inflammation, work on nerve endings to make you itch, affect blood pressure and muscle contractions, and act on glands to cause mucus production and vasodilation, so you clog up.

A minor or isolated reaction can become chronic with repeated exposure to an allergen, or when other cells involved in the immune system, the T cells, come into play. Certain T cells remember the “insult” of the allergen and ensure that some part of the body keeps becoming inflamed. Often the allergen and the immune system become increasingly antagonistic, and the reaction worsens.

Sometimes, however (particularly with food allergies), the process is not gradual at all. This is what happened when Cameron Liflander ate tuna fish. He had to have been exposed to the allergen at least once before for IgE to be attached to mast cells and ready to react, but once the reaction was triggered by a subsequent exposure, an anaphylactic crisis occurred immediately. An allergist's tests showed that Cameron was severely allergic to fish, shellfish, mustard, sesame, peanuts, tree nuts, soy, dogs, cats, some antibiotics, mold, pollen, and dust mites. “The doctor said Cameron tested positive to more substances than almost any child he'd ever seen,” Pamela Liflander says.

Fortunately not all Cameron's allergies are deadly. But some are. Parents whose children don't have allergies tend to think Pamela Liflander is overly protective. Those parents haven't had a child come close to suffocation.

**National Jewish** Medical and Research Center was opened in Denver in 1899 as a sanatorium for tuberculosis patients. The hospital still focuses on respiratory diseases, and is one of the premier research centers in the country for the treatment of allergies and asthma. There are air-locked rooms here for issuing “challenges” to people with every conceivable severe allergy. For some people even boiling shrimp or snapping a latex glove can release enough allergens





**Catching her breath** In the “body box” at Denver’s National Jewish Medical and Research Center, Cassie Bair endures a battery of tests that measure the severity of her asthma. Allergies trigger her asthma, as they do in half the 20 million Americans who suffer from the disease. Drugs and a new diet are helping her breathe easier. “I’m keeping my fingers crossed,” she says.



MasterScreen Body

JAEGER







into the atmosphere to cause anaphylaxis. One of the important issues at National Jewish: Why the epidemic of allergies now?

There is, unquestionably, a hereditary component to allergies. A child with one asthmatic parent has a good chance of developing the condition. If both parents have asthma, the chance of occurrence increases. Studies show that pairs of identical twins have asthma more frequently than pairs of fraternal twins.

Still, the rise in allergies is too rapid to be explained solely by genetics. “The genetic pool can’t change that much in such a short time,” says Donald Y. Leung, the director of the hospital’s pediatric allergy-immunology program and editor in chief of the *Journal of Allergy and Clinical Immunology*. “There have to be environmental and behavioral factors as well.”

Dozens of theories blame everyone from urban landscapers for favoring male plants, which are the ones that produce pollen, to women who don’t breast-feed. Breast-feeding,

the theory goes, confers greater protection against allergies. After all, it does seem to give babies greater immunity from colds and other infections.

**Another probable** factor: diet. “Reduced fresh fruit and vegetable intake, more processed food, fewer antioxidants, and low intake of some minerals—these are all shown to be a risk,” says Harold Nelson, a professor of medicine at National Jewish who is considered one of the wise men of allergy and immunology.

The use of antibiotics may also be a cause of rising allergy rates. Certain bacteria in the intestine are associated with greater or lesser chances of having allergies. Researchers believe, as Donald Leung says, “Overuse of antibiotics may be disrupting certain gut flora that suppress allergy.”

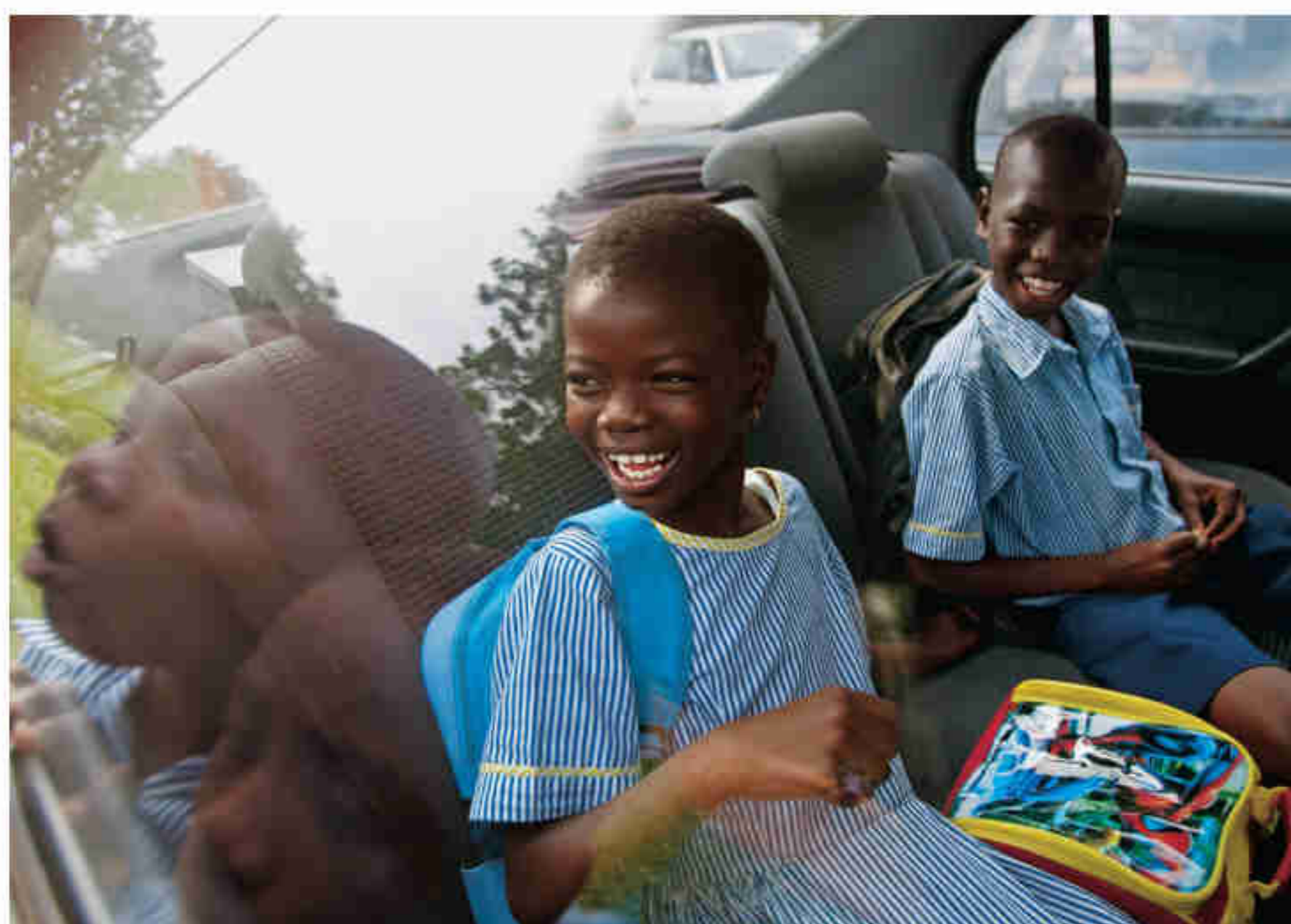
Stress and the hormone cortisol, which plays a role in the body’s reaction to stress, also affect allergic illnesses. In times of stress the immune



As countries become more industrialized, the percentage of population afflicted with allergies tends to grow higher.

### Medical mystery

Consider two children in Ghana: Zadok Agbeko (left, in striped pants), who lives with his family in a rural hut, and Joshua Asante, who is chauffeured with his sister to an urban school. Zadok suffered from a parasitic worm infection, but had no allergies; Joshua suffers from hay fever, but hasn't had worms. Do these parasites, which infect two billion people worldwide, somehow help prevent allergies? Maybe. In one study, scientists found that when the immune system coexists with these worms, it produces molecules that also help suppress allergic inflammation.



system pumps itself up, ready to fight infection or otherwise do battle. Then later the pituitary gland secretes cortisol, which acts as an anti-inflammatory, essentially turning down the immune system so it doesn't overreact. "But," says Kimberly Kelsay, National Jewish's resident psychiatrist, "some people don't produce enough cortisol in response to stress to turn down the immune system, so you're left with a greater risk for inflammation. In studies of adults and kids who receive a stressor in a lab, the ones with atopic dermatitis [a chronic and likely inherited inflammation of the skin] don't show as big an increase in cortisol levels." There are some studies suggesting the same pattern occurs with asthma and hay fever.

Another key culprit: environmental pollutants. Exactly what pollutants and in what quantities are a source of heated debate. One of dozens of examples: Epidemiological studies show that children who are raised near major highways and are exposed to diesel fumes from

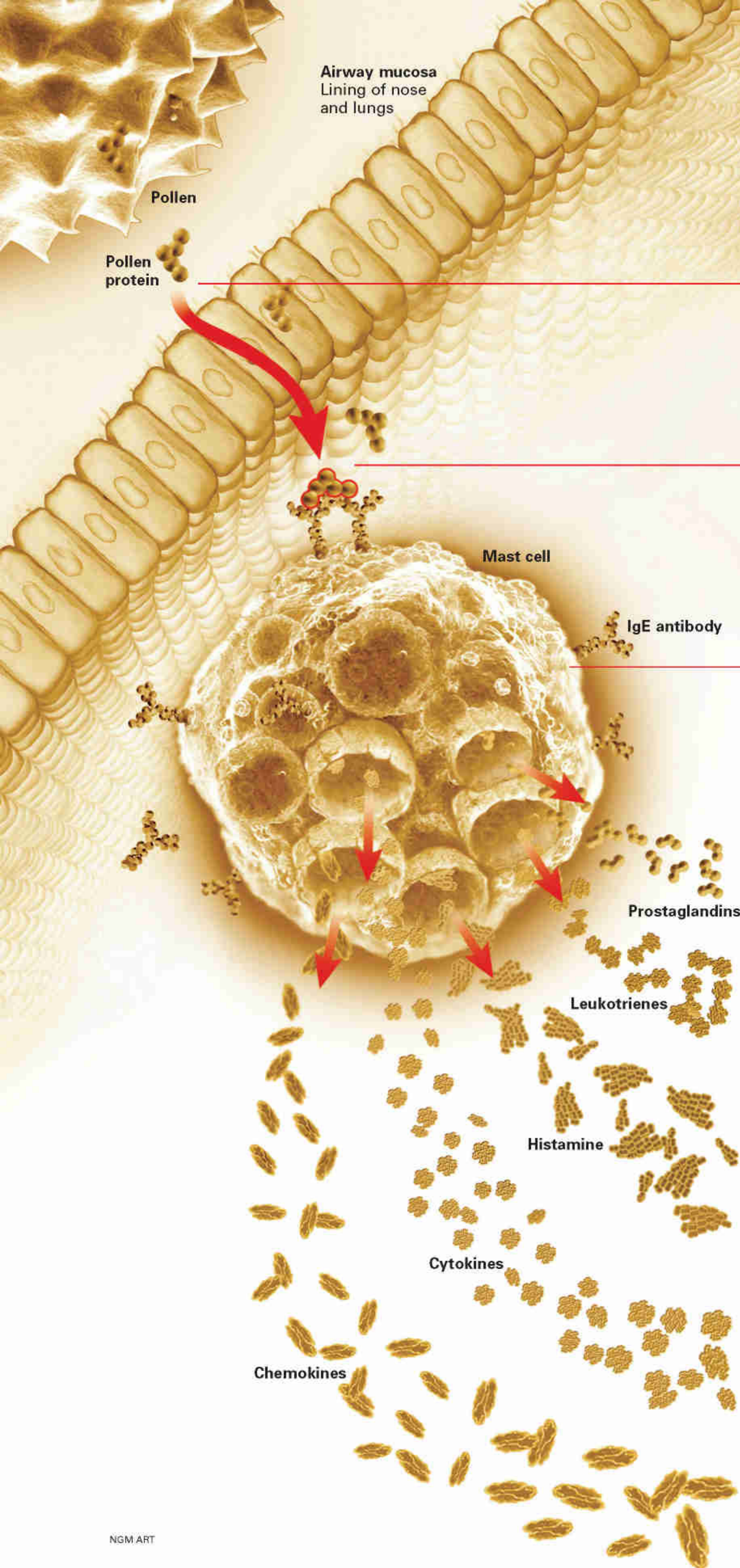
trucks have an increased sensitivity to allergens they already react to.

**Ironically it's not** just the pollutants that are doing us in. It may be too much cleanliness—or rather, cleanliness of a certain sort. A prevalent theory among allergists is known as the hygiene hypothesis. The theory has its complexities and contradictions, but the basic idea is this: If the Liflanders had wanted to prevent Cameron's allergies, they should have moved a cow into their living room. People who live with farm animals almost never have allergies.

"The hygiene hypothesis has been on the scene since people first started looking at allergies," says Andrew Liu, associate professor of pediatric allergy and clinical immunology at National Jewish. "John Bostock, the guy who first identified hay fever, noted that it was a condition of the educated. He couldn't report any cases among poor people."

Hygiene theorists say that while it's true that





**Airway mucosa**  
Lining of nose  
and lungs

**Pollen**

**Pollen  
protein**

**Mast cell**

**IgE antibody**

**Prostaglandins**

**Leukotrienes**

**Histamine**

**Cytokines**

**Chemokines**

# Attacking a Harmless Intruder

## 1 Enter

Allergen particles—proteins from pollen, animal dander, or other substances that are normally harmless—penetrate the body by inhalation, ingestion, injection, or skin contact.

## 2 Combine

IgE antibodies, defenders in the immune system, attach to the surface of a mast cell and wait for subsequent contact with an allergen. Then allergen proteins bind with the IgE, alerting the mast cell to react to the intruder.

## 3 Trigger

Mast cells, which help the body fight parasitic infections, overreact when allergens enter the picture, emitting waves of biochemical defense.

## 4 Release

The symptoms of an allergic reaction are caused by a series of chemicals released from the mast cell. Some act right away, others gradually after the first response.

### First response

Prostaglandins, leukotrienes, and histamine work on nerve endings to cause itching and inflammation of tissues; they act on glands to cause mucus production and vasodilation, so you clog up.

### Later response

Cytokines and chemokines are cell-to-cell communicators. They recruit other cells that slowly increase tissue damage.

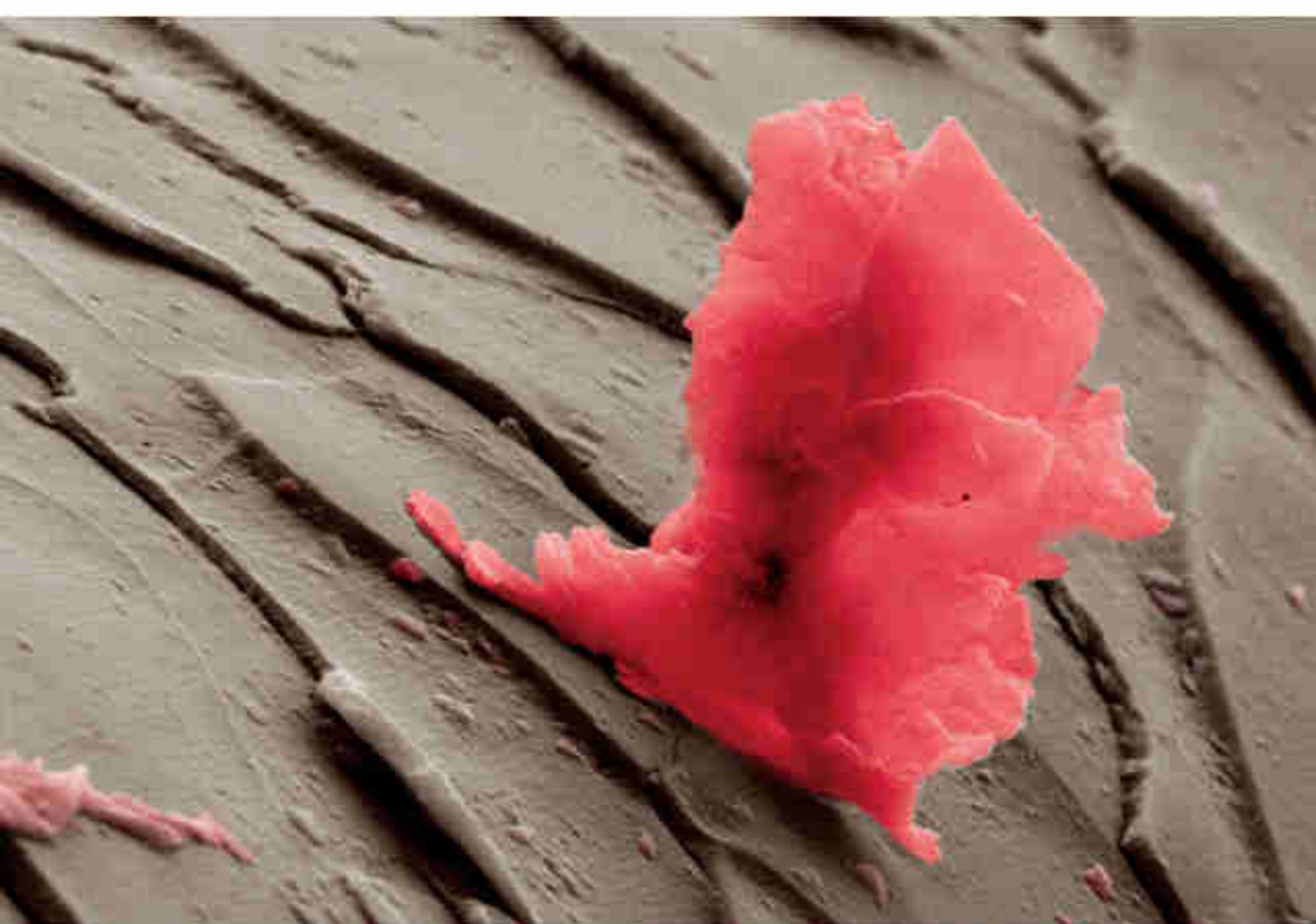




DERMATOPHAGOIDES FARINAE 1620X



ACACIA SPP. 420X



CAT DANDER 3200X

**Small stuff, big impact** A scanning electron microscope brings three common allergens into focus: Cat dander (bottom) and acacia pollen (middle) release proteins that can provoke an allergic reaction; a dust mite (top) delivers its proteins in tiny bits of feces that land in carpets, bedding, and upholstery.

COLOR-ENHANCED SCANNING ELECTRON MICROSCOPE IMAGES:  
BOB SACHA AND JACOB LOUIS MEY, AMNH

industrialization brings with it better health care and fewer serious childhood infections, it also brings an obsession with cleanliness. We are not exposed to dirt at a young enough age to give our immune systems a good workout. Also, because of the high cost of energy, more homes are built with an eye toward energy conservation, with better insulation—insulation that seals in mold and dust, enemies of allergy sufferers.

But if dirt is a good thing, why are allergies and asthma so prevalent in poor, inner-city neighborhoods? “It’s not just a question of exposure to dirt that reduces allergies—it has to be the right kind of dirt,” says Liu. “We’re talking about exposure to endotoxin and good microbes in soil and animal waste.”

Reams of research bear out the hygiene hypothesis. “There was a famous study,” says National Jewish’s Nelson, “where one of the protective factors for asthma was having a pig in the house.”

It would be helpful if immunologists and epidemiologists were able to tease out each factor contributing to the escalation of allergies and say, *J’accuse!* That’s probably not going to happen. Instead, researchers are attacking the problem on all fronts. Their unspoken attitude? We’ve made a mess of this planet, and we may not be able to fix it. The best science can do is help us fix ourselves.

**Since most of us** are unable to room with a pig, we have to come up with a plan. Can we avoid allergies altogether? Can we get rid of allergies we already have? Can we desensitize our immune systems?

“We still don’t know exactly how to prevent allergies,” says Andrew Liu. “We know the immune response is supposed to be a helpful one, that it’s not supposed to be the *cause* of disease. We know that the immune system of someone with allergies needs to be reeducated. But how? It’s not always clear.”

Leung agrees, adding, “If you are exposed to endotoxin or other microbial products early in life, it may prevent allergies. But later in life the early exposure may actually make things worse.” There are those who argue that to prevent allergies, we should reduce or eliminate exposure to harmful allergens at an early age. Others believe allergens should be administered in large quantities at an early age. Many believe it depends on





the specific allergen. And food allergies may work on an altogether different principle. Confused? So are the allergists.

**Improvements in immunotherapy** have been hard to come by. The overall idea behind immunotherapy is to find something that alters the T-cell reaction to the allergen to one not associated with allergic symptoms when the allergen is reintroduced. Currently, the best method is to have injections containing increasingly larger quantities of the offending substance every week for three to five years. “It requires time, investment, and money,” says Harold Nelson.

At Johns Hopkins School of Medicine’s Asthma and Allergy Center, clinical director Peter Socrates Creticos is studying what is essentially a ragweed vaccine. The vaccine contains the principal offending allergen from ragweed along with bits of DNA. The DNA acts as an adjuvant that allows the body to recognize the allergen

more efficiently and begin a string of cellular events in the immune system that shuts down chronic inflammation.

Best of all, Creticos notes, “Just six weeks of injections before ragweed season caused people to experience 70 percent fewer symptoms. That’s about the same degree of improvement we normally see with the earlier therapy after three years,” he says. Better yet, the effects of the vaccine carried over to the next ragweed season. “We didn’t just reduce symptoms,” Creticos says, “we turned off the disease.”

Some drugs are also being tested for treatment that works on a different principle. For example, Xolair, injected monthly, soaks up IgE like a sponge, ensuring that it cannot dock on mast-cell receptors and trigger an allergic reaction. It’s no cure for the severely allergic, and a single injection costs \$500.

Greg Rogers, a retired contractor, participated in the trial of a similar drug at National Jewish. “Before my treatment,” Rogers says, “I would



Currently, the most effective immunotherapy is to have shots every week for three to five years.

**Golden age** Beside a highway near Washington, D.C., ragweed runs riot in a possible preview of the future: Higher temperatures and rising levels of atmospheric carbon dioxide make ragweed grow faster, flower earlier, and produce stronger pollen. According to USDA plant physiologist Lewis H. Ziska, pollen production could double by the end of the century. That's bad for hay fever sufferers, but good for pollen farmers, who sell their crop (right) to pharmaceutical firms for up to ten dollars a gram. Allergic patients receive shots of pollen extract that help reprogram the body's immune system.



have to be rushed to the emergency room if I ate half a peanut. Now I can eat nine or ten of them and survive.”

Not that Rogers would care to eat nine peanuts, or even one, but by raising his threshold of sensitivity, Rogers won't die by accidental ingestion.

**What about** preventing allergies in the first place? The greatest hope in this area may come from the studies of what immunologists call the atopic march. Two-thirds of kids with atopic dermatitis, or eczema, will develop hay fever, and 50 percent will develop asthma. For highly allergic kids such as Cameron Liflander, atopic dermatitis is often the first stop in the long march of allergies to come.

Most people have antimicrobial protectors in their skin that act as a first defense against microbial invaders. People who suffer from atopic dermatitis have low or nonexistent levels of these protectors, and as a result about

90 percent have *Staphylococcus aureus* on their skin. Some experts believe staph sets up the immune system for a life of allergies, beginning with rashes and working up to constriction of the airways.

“So essentially, skin is the portal—allergens get absorbed quickly through the skin,” says Donald Leung. “Our idea is that if we can quickly reestablish the integrity of cracked, inflamed skin, we may be able to stop the predictable progression of allergies.”

National Jewish has spearheaded a five-year study on more than a thousand kids with atopic dermatitis to see if rapid treatment halts the onslaught of allergies. The hospital is comparing traditional steroidal creams, which have some unpleasant side effects with long-term use, with a nonsteroidal cream called Elidel. The cream blocks a molecule called calcineurin, which is a key early activator of the T cells that orchestrate allergic response.

For a child such as Tyler Mason, the outcome









**Against the grain** Unloading a truckload of barley once gave farmer Tony D'Agnone of Alberta, Canada, swollen eyes, fevers, and the shakes. Now he wears a thousand-dollar battery-powered helmet with fans and filters that lets fresh air in and keeps allergens out. "Friends laughed at me," he says. "But a few of them wear helmets now too."



Most allergies seem relatively innocuous, and it's true that more people believe they have allergies than actually do. But the rise in allergies is real. On a global level we need to better understand what's happening.



**Waiting to exhale** Evan Green has always been homeschooled because of severe food allergies, asthma, and a chronic intestinal disorder (though no allergy to Pearl, the pigeon). He has a very restricted diet and inhales steroids twice a day to help control the asthma. "He used to swim and ride horses" his mother, Lisa, says. "Now he spends free time playing video games and watching the Food Network, which distracts him from pain and food cravings."



of this study is anything but academic. As with all the kids who end up at National Jewish, Tyler's eczema involved more than a few patches of red, scaly, itchy skin. Tyler's skin was ripped up. He got a staph infection that brought him to the hospital, and anyone visiting his room had to scrub first with disinfectant. Tyler was repeatedly bathed, slathered from head to toe with a moisturizer and then a steroidal cream to reverse the skin inflammation, and finally wrapped like a mummy, with only his eyes uncovered.

Tyler's mother, Vickie, has a picture of what he looked like when he arrived at National Jewish: less a child than a piece of raw meat on legs. After 48 hours of treatment, Tyler was closer to a red-faced kid with a bad rash.

Another possible way to stop the atopic march: Get infants to chow down on probiotics, or friendly bacteria, such as *Lactobacillus* found in certain yogurts. Some studies have shown that these beneficial bacteria are reduced in the guts of the allergy-prone. At a trial in Perth, Australia, infants treated with probiotics showed significant improvement in their chronic eczema two months after finishing an eight-week course of treatment.

**These days**, Cameron Liflander says he feels fine most of the time. It takes a lot to make him feel fine. For his asthma he needs a daily cocktail of steroidal and nonsteroidal drugs: Proventil and Flovent in his inhaler, and Nasonex nasal spray. For his eczema he uses an antihistamine called Zyrtec and a topical steroidal cream. The steroids do not seem to have stunted his growth—one of the worrisome side effects of long-term steroid use in children—and he has adjusted to the antihistamine so that he does not usually feel drowsy.

Life is looking up for Cameron. He has had some of his allergic responses retested. The reaction to certain substances is modulating with age: He now tolerates soy (a huge relief because it's contained in a vast array of products). He has also started shots for his environmental allergies, and Pamela hopes that soon he'll be able to live without the daily doses of steroids.

Still, the Liflander's '60s-style ranch house has hardwood floors and tile instead of carpets to prevent accumulation of mold, and no window treatments that might collect dust. Teachers, friends, and the health staff at school help

keep Cameron and peanuts apart. Pamela is careful about playdates. "It has to be where someone could deal with an allergic reaction. But we want to try to avoid keeping him in a plastic bubble."

The rise in the number of people with allergies is changing the way we live and what we buy. Suddenly there's a booming market for products and services that were unimaginable 30 years ago. Hotels offer allergy sufferers rooms with special ventilation systems and linens washed with nontoxic products. Architects such as Roy Prince of Santa Barbara, California, specialize in "healthy houses." "Here in Santa Barbara, I'd say the number of people interested in buying environmentally friendly, nontoxic, 'green' houses has doubled in the past couple of years," says Prince.

Pollen-free sunflowers, first developed for floral arrangements that wouldn't soil tablecloths or clothes with yellow dust, are now marketed to allergy sufferers. So, too, are certain breeds of dogs: Havanese and coton de tulears—fluff balls about the size of a shih tzu. More familiar "hypoallergenic" breeds include Wheaten terriers, poodles, and Portuguese water dogs. (Incidentally, no dog or cat is truly hypoallergenic. Allergens come from dander, saliva, and urine, not from hair.)

More important, scientists are finding ways to get rid of the allergenic proteins in common offenders. Researchers at the University of Melbourne in Australia claim to have developed, with gene silencing, the first hypoallergenic rye grass. (It doesn't cause hay fever.) The U.S. Department of Agriculture has developed a strain of soybean that lacks the major allergy-triggering protein that once caused such misery for Cameron. Scientists are crossbreeding existing peanut types that have lower levels of the proteins that cause anaphylaxis.

So Cameron Liflander and others like him may one day live in a world that's far more comfortable. But the question remains: How much genetic engineering is feasible? And even if we can eliminate the allergens we fight today, what will our immune systems decide are the enemies tomorrow? □

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**Rising Discomfort** See more images of how people from England to inner-city Chicago deal with allergies in a photo gallery at [ngm.com/0605](http://ngm.com/0605).





## Myanmar's River of Spirits

In a country filled with strife, the Irrawaddy is a source of hope for the Burmese people. It is where they wash, what they drink, how they travel, where they pray.





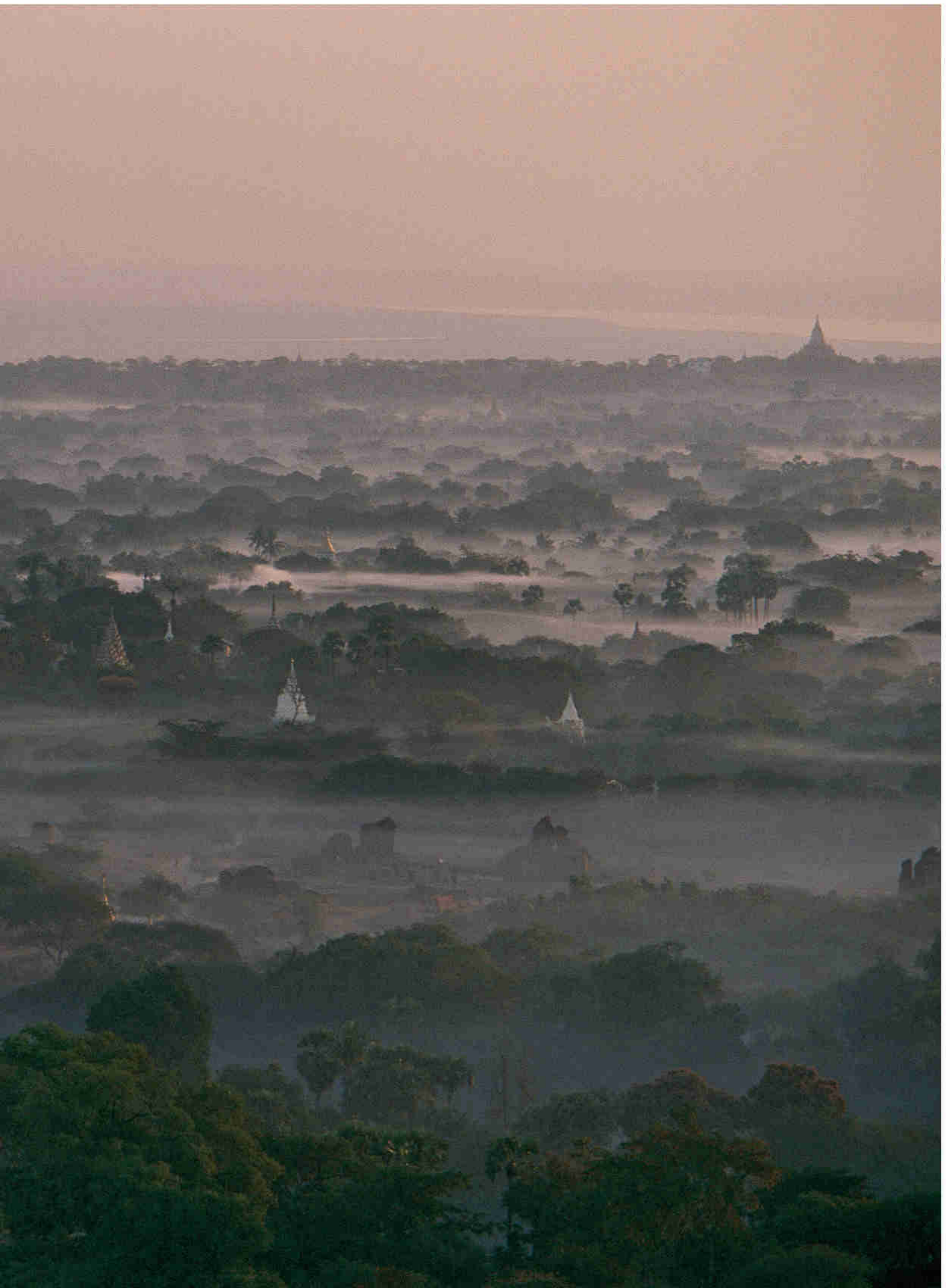
Than Swe Thant, a laborer, bathes in the Irrawaddy River near Mandalay.





The spires of Buddhist shrines float in the mist at Bagan on the Irrawaddy. The former royal capital is a tourist draw in a country where travel is tightly controlled.







By Kira Salak • Photographs by Steve Winter



On the river highway at Nwe Nyein, a cargo boat takes on a load of straw-packed pots bound for Israel, while another delivers wood for the pottery kilns. Some of the river's most lucrative shipments—teak and other hardwoods—head for India and Thailand.





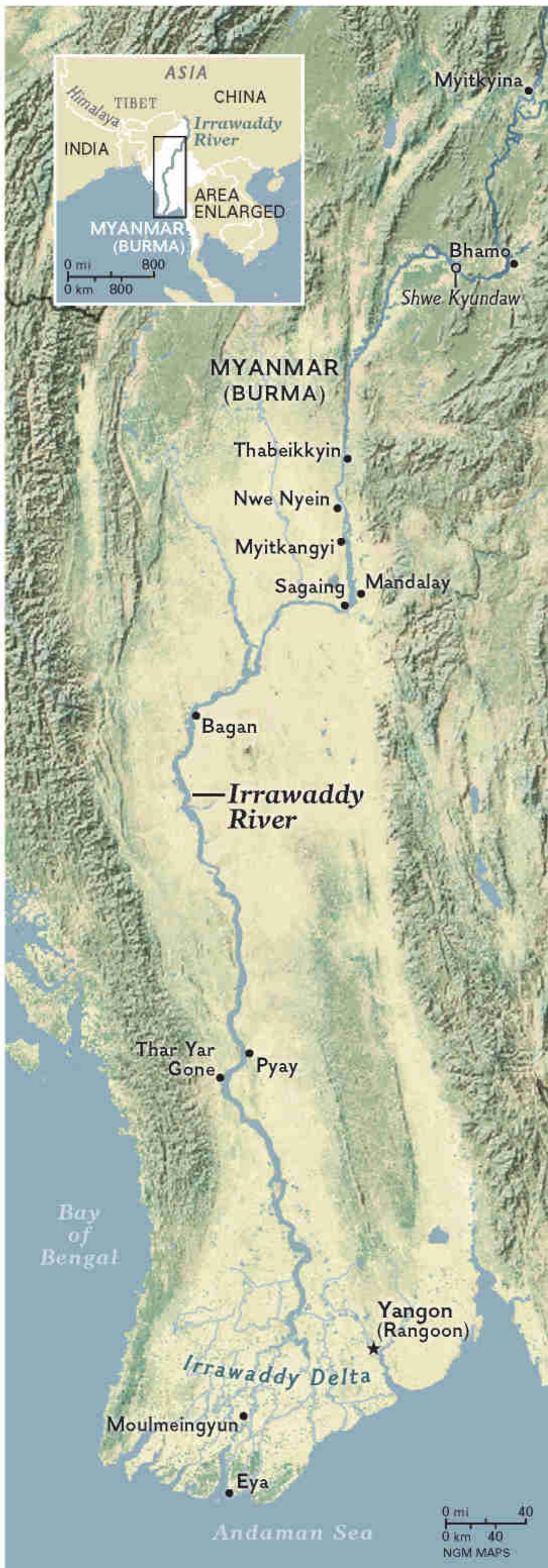
I've always believed the best way to know a river is to paddle it, to feel its undercurrents and speed, to take in the changing nature of its banks. I wanted to explore the romance of Myanmar's Irrawaddy River, which has stirred the imagination of some of the world's greatest writers, such as Kipling and Orwell. The name "Irrawaddy" is an English corruption of Ayerawaddy Myit, which some scholars translate as "river that brings blessings to the people." But it's less a river than a test of faith, receding during the country's dry season until its banks sit exposed and cracking in the sun, only to return each spring with the monsoon, coming to life, flooding fields, replenishing the country with water, fish, and fertile soil. The Irrawaddy has never disappointed the Burmese. It is where they wash, what they drink, how they travel. Inseparable from their spiritual life, it is their hope.

So I set out to experience the Irrawaddy, the historical lifeline of Myanmar, paddling my first 340 miles in a kayak. The waters are icy cold to the touch as I get in my inflatable red kayak near Myitkyina and shove off into the brisk current, the soft blue waters winding with patient certainty toward distant hills. Shelducks, lounging in the shallows, take to the air, their ruddy feathers gleaming in the sunlight. Civilization quickly passes as I leave Myitkyina behind me, and save for the solitary gold panner digging into a sandbar, I have the spread of river and sky to myself.

The peace around me belies Myanmar's recent history. Today the country is notorious as the place where Nobel Prize winner Aung San Suu Kyi has



## A shrine on a wobbly raft contains a bronze statue of a



been under house arrest for 10 of the past 17 years. It is a totalitarian state controlled by a group of ruling generals who in 1989 changed the name of the former British colony from Burma to Myanmar, a version of its precolonial name. In 1990, Suu Kyi's National League of Democracy (NLD) won more than 80 percent of the seats in national elections. The ruling junta, refusing to relinquish power, ignored the election result and clamped down on all opposition groups; in 2003 dozens of Suu Kyi's backers were reportedly killed or injured during the "Black Friday" attack by government supporters. Meanwhile, human rights reports have cited evidence of killings and torture as hundreds of thousands of villagers in ethnic communities have been forced to abandon their homes and relocate to deny insurgents a civilian base. Last year, U.S. Secretary of State Condoleezza Rice condemned Myanmar as one of the world's six "outposts of tyranny."

Surely it is this troubled history that follows me along the Irrawaddy as I make my long journey to the sea, and that offers an explanation for why my government guide, Jiro, who follows behind me each day in a motorized boat, tells me I shouldn't talk to anyone about politics or religion. Surely it helps to explain why large swaths of the country are off-limits to tourists, who are kept to a well-trodden route leading from the capital of Yangon to Mandalay to the temples of Bagan. To deviate from this route—to paddle a kayak down a river—arouses suspicion.

Jiro, 33, works for the Ministry of Tourism and will be filing reports on me with police or military intelligence posts along the river for the next five weeks. He is an amiable and gregarious man who got married days before I arrived. He knows this isn't how I envisioned the trip, but there's nothing he can do. We strike a compromise: He keeps his boat far away so I can paddle with the illusion of being alone.

Gratefully, the Irrawaddy knows nothing of politics. It is 1,300 miles of indifference to such things. No matter what happens, I can count on it to carry me along, as if the river were a metaphor for the teaching that guides the



## Buddhist monk: Shin U Pa Gota, the “saint” of all waters.



Worn-out monks' robes are reincarnated as sails on taxi boats at Pyay. From its lofty source near the Tibetan border (map), the Irrawaddy flows cold and undammed for its 1,300 miles.

89 percent of Burmese who are Buddhists: All that arises, passes away. These waters speak of glacial beginnings in the snow-covered peaks of the Himalaya below Tibet. They have surged through jungle-covered highlands to emerge in the sun-scorched plains of central Myanmar, where they will continue to the ocean, releasing finally into the Andaman Sea.

Docked beside one village, I find a small, lavishly decorated shrine on a wobbly bamboo raft—the first of a handful of such shrines I will see along the river. Inside is a bronze statue of Shin U Pa Gota, the “saint” of all waters. Local villagers have left offerings of flowers, rice cakes, and locks of hair at his altar. According to legend, Shin U Pa Gota grew up a troubled boy until the Buddha visited him and brought him instant enlightenment. From that moment, he spent his time meditating in the Irrawaddy.

He is the saint of boatmen, of fishermen, of anyone who relies on the river. Bowing before him, I hope he is the saint of kayakers, too. In another day or two, the villagers will set the raft loose so it can continue down the river, bringing blessings to the next village that takes it in. I wonder if the raft will make it all the way to the end of the river. I can hardly imagine that end for myself now, the river opening wide, taking me into limitless blue waves.

**P**ast the town of Bhamo, my paddling becomes a pilgrimage, each bend in the river, each rise of a hill promising the sight of a bright white pagoda pointing heavenward. Riverside temples smell of sandalwood incense and jasmine flowers. Bells on pagoda steeples tinkle in the breeze. The river winds past pristine 800-foot-high cliffs leading to Shwe





Black floats mark nets at the river's mouth, where each haul brings in a few more cents and vital protein. Despite its fishing grounds and rice fields, Myanmar is one of Asia's poorest nations.







**I hold out candy to the children.** “I come in peace,” I say.



Wary of visitors, Khin Myo Myo, wearing traditional bark-paste makeup, hugs a son tightly. Her other boy—and his parrot—have eyes only for a plate of rice, often the family’s main meal.

Kyundaw—Golden Royal Island—where thousands of stupas rise from a tiny island barely half a mile long.

I park my kayak on a sandbar near white steps that rise from the water’s edge. Everything is strangely silent. No one is around; to the Burmese people, the Golden Island is an unspeakably holy place on the Irrawaddy, where the Buddha himself is said to have pointed, announcing that an island would arise. And not just any island, but a place where a pagoda would be built along with 7,777 stupas, each to contain a relic from his own body after he died. The Golden Island rose as prophesied, and more than 2,500 years later the promised stupas still stand, crumbling from the heat and dust of eons.

An old man in saffron robes greets me with a smile and a bow. He is the head monk, the Venerable Bhaddanta Thawbita. At 82 years old, he

looks as much a relic of the ancient island as its stupas. He has lived on the Golden Island his entire life, beneath its arching bodhi trees and golden pagoda. During World War II, he watched as Japanese soldiers hid among the stupas, prompting Allied Forces to bomb the entire island. Two buildings survived the damage completely unscathed: the main temple and a crypt where four sacred statues—depicting the Buddha’s previous incarnations—are kept, each believed to contain his actual blood.

They are considered such holy objects that in 1997 General Khin Nyunt—since ousted from the ruling junta—decided he wanted to move them from the island to a special temple in the capital. Thawbita strongly cautioned him against it. Witnesses later described how at the moment Nyunt reached the river with the statues, the sky grew dark and a violent storm began. Terrified,



## Before long, my bag is empty.

the chastened general promptly returned them.

Busy with visiting locals, Thawbita has his assistant monk, 67-year-old Ashin Kuthala, guide me into the temple. I expect the statues to be stored deep in a vault, far from visitors, but instead they rest on silk sheets inside a gilded cage just a few feet from passersby. I find their close proximity a rare gift. I gaze at the large padlock on the metal door. I ask Kuthala if he ever opens the door to the cage.

“Only for VIPs,” he says. “For prime ministers, heads of state.”

“Oh.” I study the statues. I press my case. Kuthala takes a moment for consideration—and then goes to get the keys.

He asks me to sit on the floor just outside the chamber. Unlocking the door, he goes inside and brings out one of the statues. Holding it, he asks me to pray. He places the statue on top of my head and begins reciting something from scripture. My eyes brim with tears. I’m lost in time.

**T**he dry zone of central Myanmar, though one of the country’s most populated regions, receives fewer than 30 inches of rain a year. The land is brown and parched, patches of cactus providing the only green. Each day the heat reaches at least 115°F, dust clouds blooming at any suggestion of wind. It’s next to impossible to stay hydrated, my only shade being the four-inch brim of a hat. As I paddle, streams of barges overloaded with old-growth teak logs come at me like leviathans; it’s a wonder there are any trees left. The river, passing numerous towns, becomes covered for miles with raw sewage.

As I kayak through floating trails of excrement, I am bolstered by the memory of a local woman named Than, 35, whom I met squatting on the rocky shore near the town of Myitkyina. Her wiry forearms were burnished a coffee brown from the sun, and she wore a dirty sarong around her tiny waist. All day long she raised a mallet over a pile of rocks before her, cracking them into halves, then into fourths, to sell to the roadbuilders. Her two-year-old son, naked and with a bloated belly, stood nearby; her two daughters, ages three

and twelve, helped gather the rocks. I asked how long she’d been doing such work. “Ten years,” she said. There was no bitterness in her voice. Just the crack of her mallet on a new stone.

Since 1996 the Myanmar government has sponsored a campaign to encourage tourism, but there’s been much debate in the West about traveling to this country. Suu Kyi advises against it, arguing that tourism funds the government’s oppression; other Burmese exiles believe tourism creates much needed jobs for local people and provides foreign witnesses to internal conditions. Shortly after I’d arrived in the country, I shared a taxi with a stranger in Yangon who suddenly started telling me about his support for Suu Kyi and his expectations of the collapse of the country’s military leadership. There seems to be a need among people to talk to someone—anyone—from outside the country. To tell the world about a hidden, deep suffering. Unwittingly, I find that I am viewed less as a tourist than as a witness.

As I pull my kayak onto the shore of the tiny village of Myitkangyi, children gather nearby, mouths agape. When I take a step toward them, they run off, screaming. I think of how I must look—bush hat and sunglasses, my face coated with white sunscreen. I remove as much of it as I can. A sole child remains, a toddler of about three, who, to judge from the screams of an older boy hiding behind a boat, hasn’t the good sense to avoid strange white women arriving in kayaks. When I turn my back, the older boy leaps out and seizes the child, dragging him to safety.

The children look skinny; UNICEF reports 32 percent of Burmese children under five years of age are malnourished. I take out a bag of candy from my backpack and hold it out to the children. “I come in peace,” I say. An adult approaches and encourages them to snatch a piece of candy. Before long, my bag is empty.

Myitkangyi is a primitive village. It has no electricity or running water, no motorized vehicles, no telephones or paved roads. Everyone lives in thatch huts on stilts, and the only ground transportation is by oxcart. Like most villages along the river, it is self-sufficient, with





Bamboo gets hurled, but huge teak logs—called “brown gold” by locals—require a crane as forest products come ashore at Sagaing. Myanmar’s rich forests are shrinking as teak trade booms.







## Numerous spirits live along the river, and worshipping

its own blacksmith, carpenter, and wheelwright.

I pitch my tent on a sandbank across from the village, and adults wander over to sit on their haunches and study me for hours. When I eat dinner in the boat, word goes out. Soon a large crowd has gathered, sighing in unison as I open a can of Coke, exclaiming if I drop something.

The local fishermen are a bit more used to outsiders. A few scientists have recently come to the tiny village to witness an unusual ritual: using dolphins to help catch fish. To San Lwin, 42, a fisherman who shows me the practice the following morning, there is nothing remarkable about this. His father taught him to fish with dolphins when he was 16; the practice has been passed down for generations. Lwin's face, bronzed and creased from the sun, expresses a sort of reverence as he studies the silver waters for sight of a dolphin fin. "If a dolphin dies," he says, "it's like my own mother has died."

We reach the area of the river where Lwin says the dolphins congregate. Classified as critically endangered, only about 70 Irrawaddy dolphins are left in the river that gives them their name. Lwin and the other men tap small, pointed sticks against the sides of their canoes and make high-pitched *cru-cru* sounds. Several gray forms, gleaming in the sunlight, arch through the water toward us. One with a calf by her side spits air loudly through her blowhole.

"Goat Htit Ma!" Lwin yells, pointing at her and smiling. "She's calling to us!" Goat Htit Ma has been fishing with them for 30 years, Lwin says.

The fishermen splash their paddles to tell the dolphins they'd like to fish together. One dolphin separates from the group and begins swimming back and forth in large semicircles. It submerges again, reappearing less than ten feet from our canoe, its tail waving with frantic urgency. Lwin winds up and tosses a lead-weighted net over the spot where the dolphin has shown its tail. The net spreads in the air like a great parachute, quickly sinking beneath the water. As Lwin slowly pulls it in, numerous silver fish flap in the strings. Lwin says the dolphins help themselves to any fish that escape the nets.

We are following the dolphins upriver when

we pass some gill-net fishermen camped along the shore. This is one of the biggest threats to the Irrawaddy dolphin: Long nets are stretched across sections of the river to catch anything and everything that passes by—including dolphins.

The fishermen call to us. "Do you want to see a big fish?" they ask. They produce a six-foot-long *nga maung-ma*, or catfish, its head a foot and a half wide, its great whiskers three feet long. The orange-and-white body, dotted with black spots, glows in the sunlight, a masterpiece of creation. Tomorrow they'll take it to Mandalay and sell it for a small fortune: 45,000 kyat or 55 dollars—about a quarter of the average Burmese's yearly income.

As we begin paddling after the dolphins again, I ask Lwin to wait.

"I'd like to buy the catfish," I say.

The gill-net men laugh at the idea, but when I show them the 45,000 kyat, they hand over the fish. My plan is to reach the deep channel on the opposite bank so I can set it free. For centuries, Buddhist monks living along the river have cherished these giant catfish; at the monastery near Thabeikkyin, monks told me they hand-feed giant catfish during the rainy season. And now Lwin, a Buddhist, eagerly embraces my plan to free the fish, noting the karmic merit I will accrue. But my sudden desire to save the fish's life is a simple matter: I just don't want that great orange fellow to die.

**N**umerous spirits live along the river, and worshipping them has become big business. Traveling the lazy way for the rest of my trip—by motorized boat—I stop near a small village called Thar Yar Gone to witness a *nat-pwe*, or spirit festival. Inside a large thatch hut, musicians play loud, frenetic music before a crowd of rowdy onlookers. On the opposite end of the hut, on a raised stage, sit several wooden statues: *nat*, or spirit, effigies. I pass through the crowd and enter a space underneath the stage, where a beautiful woman introduces herself as Phyo Thet Pine. She is a *nat-kadaw*, literally a "spirit's wife"—a performer who is part psychic, part shaman.



them has become big business.



Spirit possession convulses a woman in Pyay, an offering of raw meat clenched in her teeth. Worship of spirits, or *nats*, pervades Burmese culture, coexisting with devout Buddhism.

Only she isn't a woman—she is a he, a transvestite wearing bright red lipstick, expertly applied black eyeliner, and delicate puffs of powder on each cheek. Having traveled to the village by oxcart, smears of dirt covering my sweaty arms and face, I feel self-conscious before Pine's painstakingly created femininity. I smooth my hair and smile in apology at my appearance, shaking Pine's delicate, well-manicured hand.

The cult of the nats is Myanmar's ancient animist religion. In the 11th century, King Anawrahta established the Theravada school of Buddhism as Myanmar's primary religion. When his attempts to eliminate nat worship, considered a form of occultism not accepted by Buddhist scriptures, proved fruitless, he decided to adapt it instead, creating an official pantheon of 37 spirits to be worshipped as subordinates of the Buddha. The result is that many Buddhist

temples in Myanmar now have their own *nat-sin*, spirit house, attached to the main pagoda.

Though people still worship spirits outside the official pantheon, the 37 enjoy a VIP status, with traveling troupes of dancers, singers, and musicians reenacting the human stories of the spirits' tumultuous lives and violent deaths. But nat-kadaws are more than just actors; they believe that the spirits actually enter their bodies and possess them. Each has an entirely different personality, requiring a change in costume, decorations, and props. Some of the spirits might be female, for whom the male nat-kadaw dons women's clothing; others, warriors or kings, require uniforms and weapons.

To most Burmese, being born female rather than male is karmic punishment indicating grave transgressions in former lifetimes. Many Burmese women, when leaving offerings at





At a raucous spirit festival in Pyay, a transvestite named Tun Thein plays the role of a spirit's wife, a conduit to the supernatural. Participants thrust cash at her, hoping for good luck.







## There seems to be a need among the people to talk to



Cares seem to blow away on the beach at Eya, last settlement on the Irrawaddy at the Andaman Sea. Villagers marvel that the 2004 tsunami, which struck their village, killed no one.

temples, pray to be reincarnated as men. But to be born gay—that is viewed as the lowest form of human incarnation. Where this leaves Myanmar's gay men, psychologically, I can only imagine. It perhaps explains why so many become nat-kadaws. It allows them to assume a position of power and prestige in a society that would otherwise scorn them.

Pine, who is head of his troupe, conveys a kind of regal confidence. His trunks are full of make-up and colorful costumes, making the space under the stage look like a movie star's dressing room. He became an official nat-kadaw, he says, when he was only 15. He spent his teenage years traveling around villages, performing. He went to Yangon's University of Culture, learning each of the dances of the 37 spirits. It took him nearly 20 years to master his craft. Now, at age 33, he commands his own troupe and makes

110 dollars for a two-day festival—a small fortune by Burmese standards.

He outlines his eyes with eyeliner and draws an intricate mustache on his upper lip. "I'm preparing for Ko Gyi Kyaw," he says. It is the notorious gambling, drinking, fornicating spirit.

The crowd, juiced on grain alcohol, hoots and shouts for Ko Gyi Kyaw to show himself. A male nat-kadaw in a tight green dress begins serenading the spirit. The musicians create a cacophony of sound. All at once, from beneath a corner of the stage, a wily-looking man with a mustache bursts out, wearing a white silk shirt and smoking a cigarette. The crowd roars its approval.

Pine's body flows with the music, arms held aloft, hands snapping up and down. There is a controlled urgency to his movements, as if, at any moment, he might break into a frenzy. When he talks to the crowd in a deep bass voice, it



## someone—anyone—from outside the country.

sounds nothing like the man with whom I just spoke. “Do good things!” he admonishes the crowd, throwing money. People dive for the bills, a great mass of bodies pushing and tearing at each other. The melee ends as quickly as it had erupted, torn pieces of money lying like confetti on the ground. Ko Gyi Kyaw is gone.

That was just the warm-up. The music reaches a feverish pitch when several performers emerge to announce the actual spirit possession ceremony. This time Pine seizes two women from the crowd—the wife of the hut’s owner, Zaw, and her sister. He hands them a rope attached to a pole, ordering them to tug it. As the frightened women comply, they bare the whites of their eyes and begin shaking. Shocked as if with a jolt of energy, they start a panicked dance, twirling and colliding into members of the crowd. The women, seemingly oblivious to what they are doing, stomp to the spirit altar, each seizing a machete.

The women wave the knives in the air, dancing only a few feet away from me. Just as I am considering my quickest route of escape, they collapse, sobbing and gasping. The nat-kadaws run to their aid, cradling them, and the women gaze with bewilderment at the crowd. Zaw’s wife looks as if she had just woken from a dream. She says she doesn’t remember what just happened. Her face looks haggard, her body lifeless. Someone leads her away.

Pine explains that the women were possessed by two spirits, ancestral guardians who will now provide the household with protection in the future. Zaw, as the house owner, brings out two of his children to “offer” to the spirits, and Pine says a prayer for their happiness. The ceremony ends with an entreaty to the Buddha.

Pine goes under the stage to change and reappears in a black T-shirt, his long hair tied back, and begins to pack his things. The drunken crowd mocks him with catcalls, but Pine looks unfazed. I wonder who pities whom. The next day he and his dancers will have left Thar Yar Gone, a small fortune in their pockets. Meanwhile, the people in this village will be back to finding ways to survive along the river.

A well-dressed man in glasses is frowning at me. I am on the dock of the last major town on the Irrawaddy, in the delta region where greenery has replaced the desert scrub of the dry zone. The banks are crowded with teak vessels painted in hues that mimic the tropical landscape. But we have a problem. Someone forgot to list Moulmeingyun on my special permit. So I am here illegally. Much of the delta is off-limits to tourists. Did I journey nearly 1,300 miles on the Irrawaddy to have to turn back now, only one day from my goal?

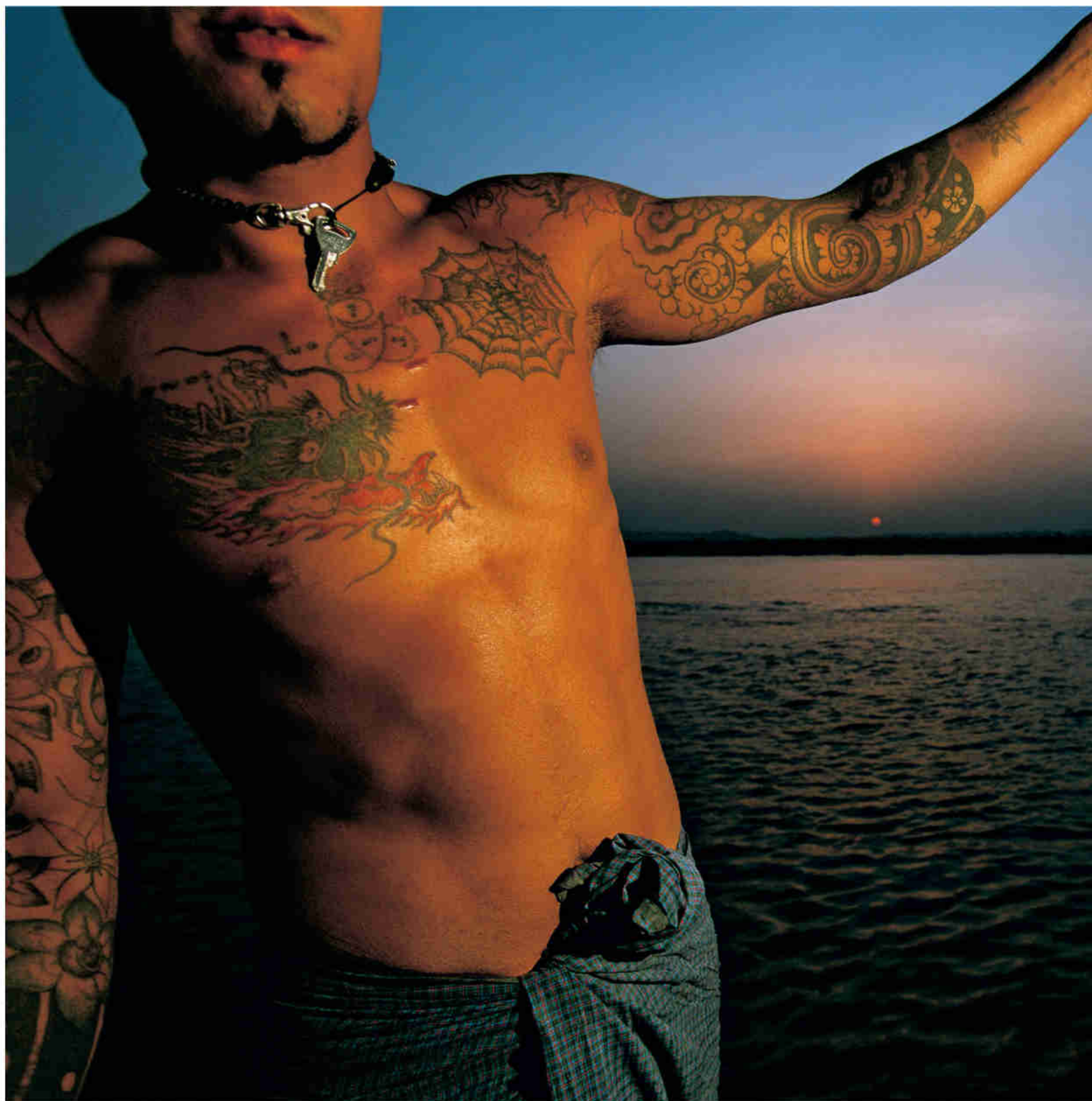
I have been with Jiro long enough to know when he is nervous. He stands straighter; he makes obsequious shows of respect. I feel terrible that my trip has turned into such a headache for everyone. Gone from Jiro’s face is the joy from his recent marriage, replaced with anxiety and exhaustion.

We’re told we won’t be able to camp along the Irrawaddy tonight; instead, we will stay in the town’s guesthouse. It is not a choice. We head there immediately, and the receptionist ushers me to a concrete-walled cubicle that’s stiflingly hot, reeking of urine, the bedsheets stained with blood and dirt. I sit on the edge of the bed to wait while Jiro reports to the police. After a while the heat drives me outside, and I have just reached the street when the receptionist comes after me, shouting that I must return to my room. When I do, I find a grim-looking man stationed in a chair outside my door, glaring at me. It’s clear I am not to leave my room again.

I am trying to accept having to end my trip in Moulmeingyun, when the local authorities inexplicably change their minds: They will allow me to go to the sea. We speed off in a motorboat before dawn, the town vanishing into the darkness behind us. As we travel down the last few miles of the river, the sun rises as pure orange light over the mangrove swamps and jungle. We arrive at villages where the people cluster around me, eager to know who I am, where I have been. The children hold their palms together reverentially to receive my offerings of candy.

We travel farther until the river suddenly breaks open to the sea. Sunlight dazzles the





At last light a dockhand in Mandalay shows off his meal-size catch. Luckier fishermen may net one of the valuable giant catfish, six feet long, that ply the river. Yet settling for less is a common survival tactic along the Irrawaddy, lifeline of a country flooded with trouble.





churning waters, my thermometer reading 119°F—the hottest day of my trip. The heat is staggering, as if the weight of the white sky is about to collapse. We putter slowly toward a distant spit of land crowned with a golden stupa: Eya village. The last village on the Irrawaddy.

As we dock beside a white beach, I trade the sight of the Irrawaddy for the aquamarine waves of the Andaman Sea. Palm trees rustle in the breeze. Canoes dot the water, where men dive for scallops. They are Eya's biggest moneymaker—the shells ten times more valuable than the meat; each ten-pound sack, sold as fodder to chicken farms, will net the equivalent of 12 cents.

All the people I meet in Eya—young and old—say they have never seen a white person. From their thatch huts raised on stilts, they climb down to get a good look at me. They have seen a man from China a few times, they say, but never someone who looks like me.

Though the Myanmar coastline was largely spared by the great tsunami of 2004, Eya's residents tell me that it did strike their village. An old woman, her eyes wide, describes the great waves coming and everyone in Eya fleeing inland. "But no one died," she says. "The Lord Buddha protected us."

As I walk through the village, down its narrow spit of land completely exposed to the sea, I miss the security of being on the Irrawaddy, which, for all its heat and mercurial moods, felt like the safest place of my entire trip.

"We have a beautiful life," the woman says. "We can get money from the Irrawaddy *and* the sea."

And they have a special job, too: The residents of Eya rescue the Shin U Pa Gota rafts that manage to make the long journey down the river and put the statues inside a special shrine in the village. Perhaps Shin U Pa Gota wasn't meant to enter the sea.

Nor am I. I'm ready to go home. I get in the motorboat, and we return to the Irrawaddy. □

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**Sacred Gathering** Watch a rare video of a spirit festival conducted by a transvestite shaman. Then view more scenes along the Irrawaddy in a Web-exclusive photo gallery at [ngm.com/0605](http://ngm.com/0605).







ZIP USA | LINDSBORG, KS 67456

# Checkmate on the Prairie

A Kansas town that has long played up its Swedish heritage is playing a new game.



Chess has become a spectator sport on Lindsborg's Main Street (left), where kids gathered to cheer for Russian champion Anatoly Karpov at a recent match. For 11-year-old state champ Charles Kinzel (above, at left), chess is a family affair.

**BY CHRIS CARROLL**  
NATIONAL GEOGRAPHIC WRITER

**PHOTOGRAPHS BY VICTOR JOSÉ COBO**

**N**ot so long ago, only a Swedish heritage festival on a sunny day could have generated this much excitement among the residents of Lindsborg, Kansas. This after all is "Little Sweden, U.S.A.," a town where it's normal for children, even teenagers, to maintain their own folk costumes. But in recent years Lindsborg has witnessed a minor revolution in self-identity, and one man is largely responsible. Mikhail Korenman has made this town crazy for the game of chess. Just look at the festivities the burly Russian immigrant has lined up for the coming weekend: A chess parade down Main Street; a match between two world champions; and a





Isaiah Jesch, 15, a star of the Karpov chess school, practices at home amid the spoils of competition. Called "The Suit" for his playing garb, he earned his biggest trophy (below) last year.

speech on world peace by Mikhail Gorbachev! All this with hardly an umlaut in sight. "This is the biggest thing in town since the King of Sweden visited here in '76," says Ken Sjogren, a longtime resident who co-founded Hemslöjd, a leading Scandinavian craft shop.

The hub of the activity is the Anatoly Karpov International School of Chess, named for the Russian player who succeeded American Bobby Fischer as world champion in 1975. Don't expect



to see the great player himself manning the phones inside the cramped teaching space on Lindsborg's well-scrubbed Main Street. With a handset clamped to each ear, Korenman, 43, is juggling the last-minute details for the weekend activities. When the phones go quiet, he plops down on a worn sofa in a corner of the chess classroom and lets out an exaggerated sigh, but he's smiling. This is home: He and his wife recently moved into the upstairs apartment. He has quit his job as assistant chemistry professor at nearby Bethany College to devote himself full-time to the game he loves—and to teaching students, who affectionately call him Misha.

"I couldn't have guessed when I moved to Lindsborg I'd someday see Gorbachev walking down the street," he says. "Voronezh, my hometown in Russia, has almost a million people, so it was like coming to a different universe." Any worries that Lindsborg, a city of 3,300 people, wouldn't offer him enough stimulation vanished when Korenman—an expert player who had competed in tournaments back home—learned



## ZIP USA



about the local chess club. He began networking with Russian expatriate players at tournaments around the country, inviting them to play in his picturesque little Kansas town. He persuaded the local Rotary Club to stage a small tournament, and in 2002 Karpov came to train for a match against rival Garry Kasparov, who'd won the world champion title from him in 1985.

Karpov beat Kasparov for the first time in years—and when he returned a few months later to lucky Lindsborg, Korenman sprang the question: Would he lend his name to a chess school in the town? “There’s something he likes about Lindsborg,” Korenman says. “He’s from a small city himself.” Soon after, Korenman says, several past presidents of the U.S. Chess Federation wanted to name another school after Karpov. “I already have one in America, in Lindsborg,” he said, “and it’s enough.” Though at least 20 schools bear Karpov’s name worldwide, Lindsborg has the only one in the U.S.

Korenman may have put chess on the map, but there’s one thing he hasn’t been able to do: Turn his students into Russians. Something about American culture, he says, prevents promising young players from training for the next step in ability. The recipe for creating well-rounded children is not, perhaps, best for making great chess players. Back in Voronezh, his eight-year-old nephew attends chess school five days a week, has lessons from a private coach, and plays in a tournament each weekend. That kind of focus seems unimaginable for most American kids—and their parents.

Several blocks north of the chess school, along tree-shaded streets of well-maintained homes, at the house of the two young brothers Korenman identifies as the most talented players in town, their mother wants to make something perfectly clear: “My sons aren’t chess freaks,” Carolyn Masterson says. “They’re talented at it, but it’s not their entire lives.”

There’s little doubt about that. It’s two nights before a youth chess tournament that will coincide with Gorbachev’s visit, and instead of practicing his rook and pawn endings or

the Sicilian Defense, Aaron Masterson, 16, is sprawled on his basement floor, blasting aliens to pieces on his laptop. His brother, Paul, 13, plans to practice some, but Aaron has five hours of rehearsal tomorrow for *Fiddler on the Roof*. Afterward, he’s off to a French horn lesson. His schedule is a rickety Rube Goldberg contraption, balancing Boy Scouts, church activities, and year-round sports.

These days Aaron is more enthusiastic about basketball than chess, though he admits he’s only average at hoops. “The difference between team sports and chess is the approval you get,” he says. There are no high fives in chess, no celebratory bear hugs from teammates, no flirtatious glances from girls in the hallway. “I have to make choices about what I want to excel in,” he says. “Chess is the one thing I have less time for.”

This does not make his Russian chess coach happy. “Everyone has a limit in chess, and he has not reached it yet,” Korenman says. “I completely recognize they have a million things to



Russian-born Mikhail Korenman, the school’s founder, teaches strategy. “Chess is competition, sport, and education at once,” he says.





Children meet to practice in Lindsborg's Swensson Park. Says Steve Kinzel, father of a young state chess champ, "Chess helps kids academically by strengthening their problem-solving skills."

do," he says of his students. "I just wish they'd spend more time on chess. But I can't tell them how to arrange their lives."

Korenman brightens when talk turns to another of his students—Isaiah Jesch, 15, who lives two hours away. Isaiah, still in eighth grade, recently won his division at the SuperNationals. He has taken to wearing suits to every competition as a sign of total dedication—proper respect for the game, Korenman notes approvingly.

At the tournament on Saturday, Isaiah plays Aaron Masterson in the final match. The two are friendly rivals who've played a number of times with mixed results. Wearing basketball shorts, a T-shirt, and a Texas Longhorns cap, Aaron needles Isaiah about his attire.

"Kids call him 'The Suit,'" he says, smirking.

"I've had people tell me they're intimidated by it," Isaiah says.

Aaron snorts derisively.

"Well, maybe to an opponent I haven't played before," Isaiah allows, with a slight frown.

The judge gives the signal, and 200 students

ages 5 to 18 make opening moves. When it's over, Isaiah, dressed for success, has defeated Aaron, dressed for basketball. But neither ends up winning the tournament.

Discussing the match, Korenman flashes an ironic smile-frown—raised eyebrows, laughing eyes, down-turned mouth. There's a long way to go if America is ever to produce another Bobby Fischer who can dominate the world's toughest Russian players, he says.

Still, the Karpov School he started in Lindsborg is a step in the right direction. "We need people to see chess as a tough, competitive sport," he says. He points to the recent poker craze as an example: Like chess, it's a chair-bound battle of wits, but somehow kids today view it as cool, maybe even a tad dangerous. "One thing that's key," Korenman muses, "we need to get chess on TV." □

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**Chess for Youth** Learn how a young Bobby Fischer became the first American world champion and find links to chess websites at [ngm.com/0605](http://ngm.com/0605).



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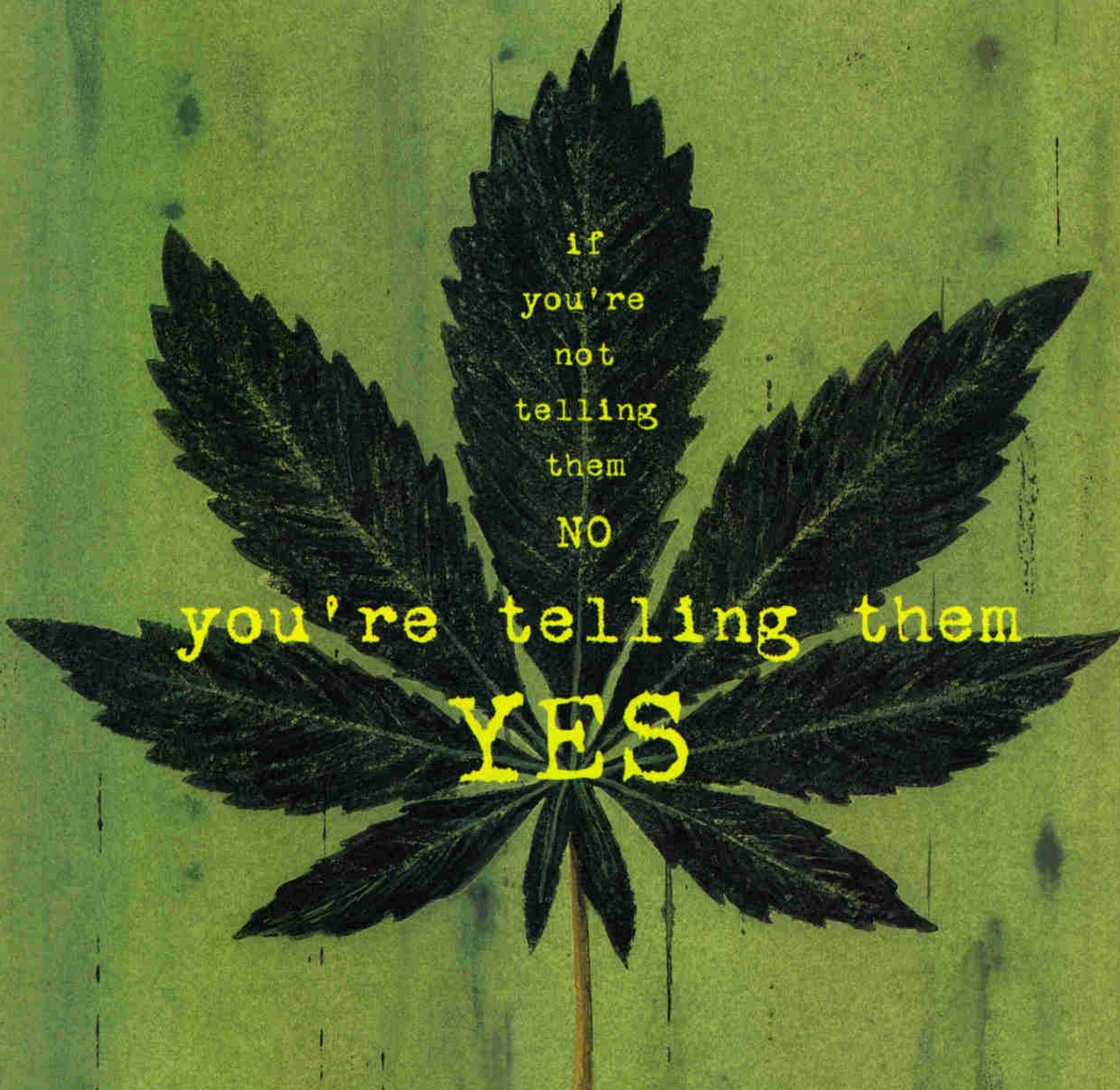


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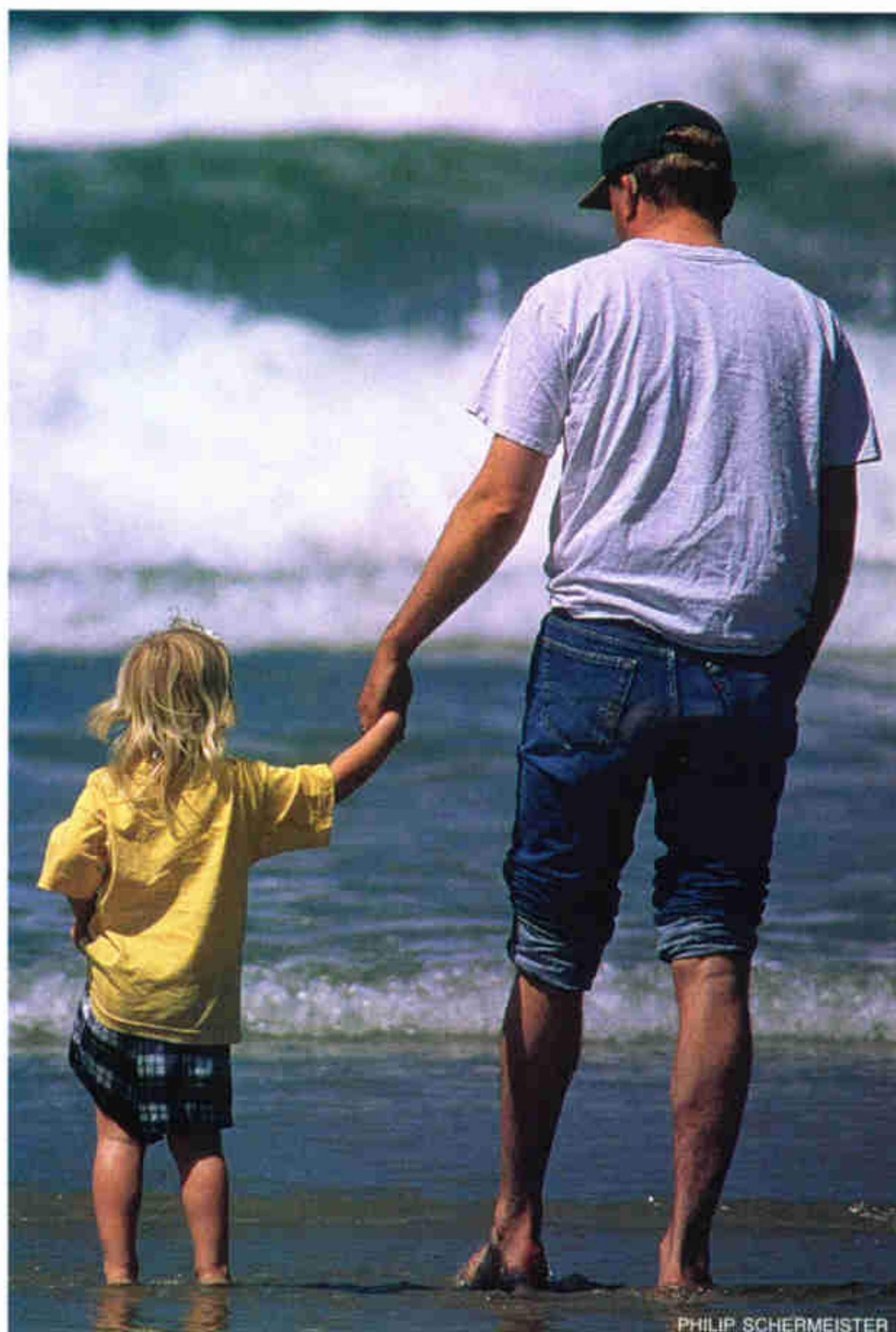
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Joel Sartore's southernmost extremities feel the bite of Alaska's North Slope.

**ON ASSIGNMENT** **Working Without a Net** Joel Sartore had this photo opportunity land at his feet while braving swarms of ferocious Alaska mosquitoes during a shoot on the North Slope. When the clouds of bugs grew thick enough, he remembers, they made a crackling sound. "I thought I'd at least try to get a nice frame out of it," says the photographer. "I just took off my shoes and socks in a pretty place and watched what happened. It didn't take long. I scratched the bites for hours afterward."



Flying low, explorer and conservationist Mike Fay spied this herd of Saharan antelopes, or addaxes, in November 2005.

**UPDATE**

**Saving the Addax**

As the Sahara's addax population dipped to dangerous lows, explorer Mike Fay—reporting from his African Megaflyover in the June 2005 issue—hatched a plan to save the antelopes from extinction. Readers sprang to action, pledging funds that will help set aside four reserves in Chad and Niger. The Sahara "is the most romantic place on Earth," Fay says. "We need to create an entire movement to save the wildlife there, using the addax as a flagship."





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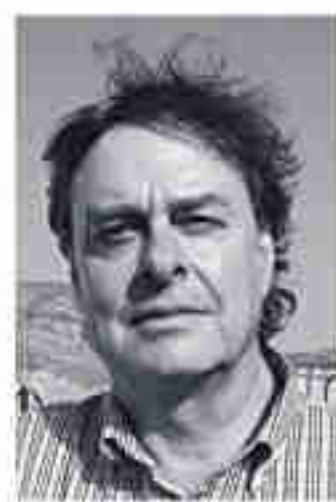
Photographer Catherine Karnow, at right, and writer Sandy Mitchell tag along with Prince Charles on a tour of royal property in Herefordshire.

## ON ASSIGNMENT

### A Prince's Trust

The Prince of Wales rarely gives interviews to reporters. But the lifelong GEOGRAPHIC fan “actually encouraged his staff to invite us along,” says writer Sandy Mitchell. Photographer Catherine Karnow felt she came to know what the prince cares about, what drives him. Admiring a picture she’d taken of a fisherman with two hefty salmon (left), the prince told her, “That’s a big catch.” Karnow and Mitchell felt the same way about his help on their story.

## Contributors



### Andrew Cockburn

While reporting on the Gospel of Judas, a 1,700-year-old manuscript based upon an even more ancient original text, writer Andrew Cockburn was intrigued to learn that some early Christian controversies are still alive today. Gnostic beliefs expressed in the Gospel of Judas were condemned as heresy starting in the second century and continue to come in for criticism. Pope John Paul II denounced “the return of ancient Gnostic ideas under the guise of the so-called New Age.” As for the split in A.D. 451, when the Coptic Church broke away from the Catholic and Eastern Orthodox Churches, says Cockburn, “A Coptic monk was telling me, ‘They were right. They were on the right side!’ He was just as fired up as monks must have been 1,500 years ago.”

### Chris Carroll

Even though he learned the basics of chess as a young boy,

staff writer Chris Carroll was never much of a player. Before leaving on assignment to check out the burgeoning chess scene in tiny Lindsborg, Kansas, he practiced against his computer—and that practice paid off. In his first match against a student from Lindsborg’s chess school, Carroll prevailed. His opponent “was only six, but he handled losing well,” the writer admits. Carroll then took on the boy’s older sister, age nine. He lost.



### David McLain

“This was one of the hardest stories I ever had to shoot,” says David McLain of the extensive research required for his feature on allergies. His work on the article also had the photographer worrying about dust mites. Although the creatures aren’t a problem unless allergies are present—and McLain doesn’t have allergies—“After this assignment I immediately went out and bought new pillows and bedding.”



### Kira Salak

For companionship on her trip down the Irrawaddy River in Myanmar, Kira Salak sought the writings of George Orwell and W. Somerset Maugham, inspirations for many travelers to Burma. “I made an Orwell pilgrimage to the European Club in Katha, which was the main setting of his novel *Burmese Days*,” said Salak, who holds a Ph.D. in English literature. “Its tennis court was in full use by government officials improving their backhands.” Her favorite Irrawaddy muse, though, is Maugham, “especially when he describes the pure red sunsets on the river, which I had the fortune to enjoy nearly every evening. He wrote that ‘it is a beauty that batters you and stuns you and leaves you breathless.’ I agree.”

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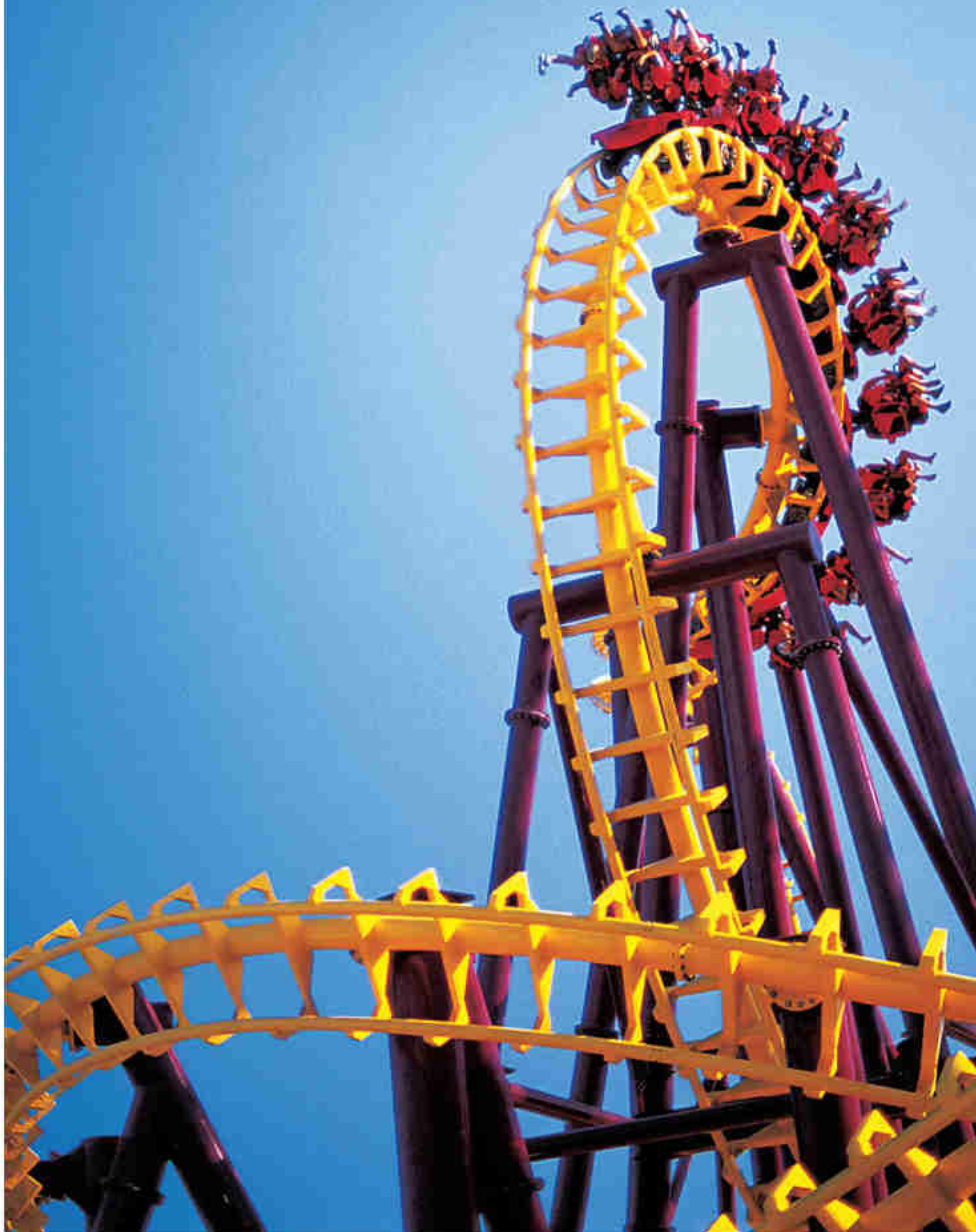
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## Special Edition

### Guide to Digital Photography

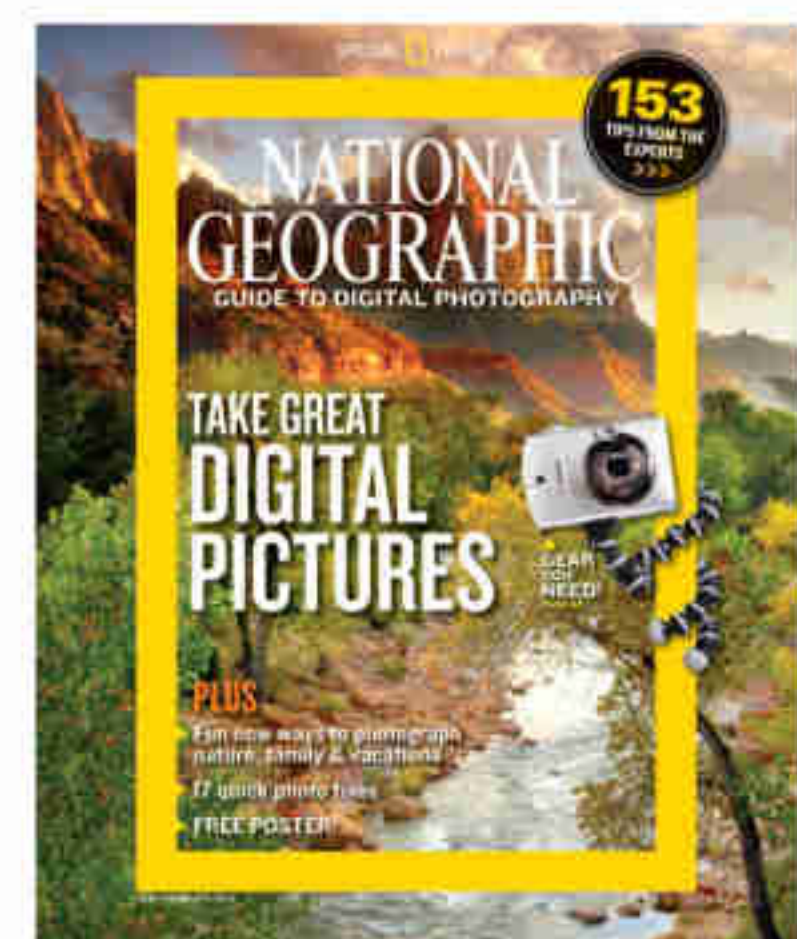
Digital cameras have revolutionized picture taking. There is a lot more to getting a good shot, though, than simply owning and aiming a digital camera. In NATIONAL GEOGRAPHIC's new special edition, *Guide to Digital Photography*, professionals including William Albert Allard, Robert Caputo, Randy Olson, and others help demystify digital photography.

- **Nature** photographer Jim Brandenburg explains the digital techniques he uses to capture the spirit and beauty of the outdoors.

- **Vacations** can be even more fun with a digital camera. Photographer Bruce Dale shows how he turned a tropical getaway into a digital experience.

- **Family** events offer boundless opportunities to hone digital skills. Senior Editor Ken Geiger shares tips on shooting birthday parties and weddings.

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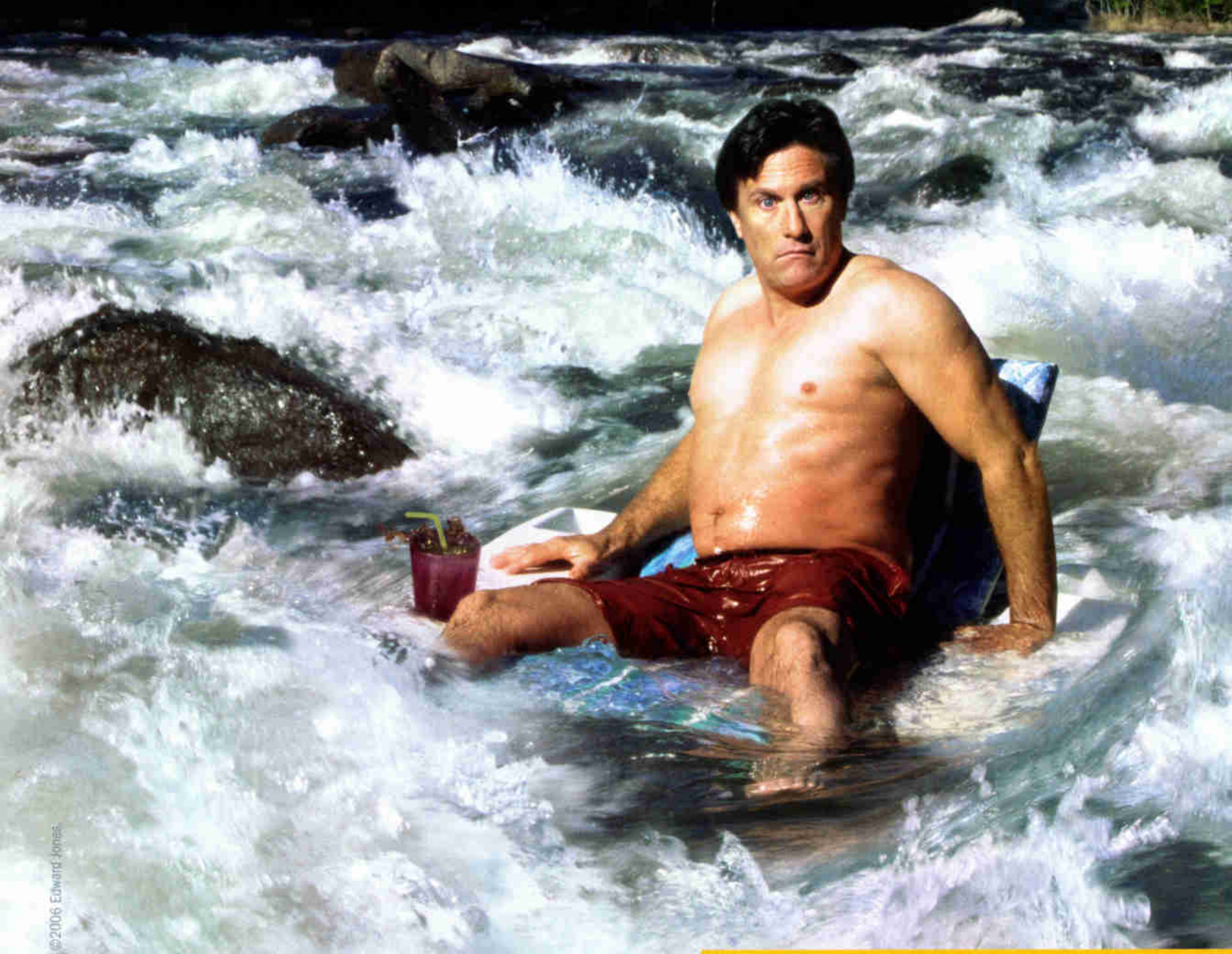
**Climb to Power** Queen Elizabeth II reaches out to four-year-old Prince Charles as he scales a window ledge at the royal family's Balmoral Castle in Scotland in 1953. NATIONAL GEOGRAPHIC published this image in September of that year in an article on Elizabeth's coronation, titled "In the London of the New Queen." "I encountered quite a crop of stories about little Prince Charles," noted the author, H. V. Morton. "The best, I think, was told me by a man who said he had heard it from the mother of a guardsman." After ordering several Buckingham Palace sentries to perform drills, Morton wrote, the young boy suddenly tired of the exercise. He cried, "'Come on, let's play at horses'; and the guardsmen dropped on all fours." —Margaret G. Zackowitz

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